Chapter 10

Maintenance

— Handling — After Use / Display Panel ····· 2
Handling After Use ····· 2
Handling the Display Panel ····· 2
— Storage — Device / Recording Paper ····· 3
Storing the Device ····· 3
Storing the Recording Paper ····· 3
— Cleaning — Display Panel and Housing ····· 4
Cleaning the Display Panel ····· 4
Cleaning the Housing ····· 5
Disinfecting the Blood Pressure Transducers ····· 5
Disinfecting the Temperature Probes ····· 5
Disinfecting the CO_2 Filter Line ····· 5
Cleaning and Disinfecting the SpO_2 Transducer ··· 5
Cleaning and Disinfecting the NIBP Cuff ····· 5
Cleaning and Disinfecting the ECG lead Cable ··· 5
— Battery — Handling the Battery Pack ····· 6
Handling the Battery ····· 6
Storing the Battery ····· 6
— Maintenance Check — Daily and Periodic Check · 7
About the Maintenance Check ····· 7
●Daily Check ····· 7
●Periodic Check ····· 7
Time-Change Components ····· 7
— Troubleshooting — ····· 9
ECG ····· 9
Respiration ····· 11
Invasive Blood Pressure ····· 11
SpO_2 ····· 12
Non-Invasive Blood Pressure ····· 13
Temperature ····· 14
CO_2 Concentration ····· 15
Recorder ····· 16
Telemetry ····· 16
General ····· 17
Battery ····· 18

This section describes precautions for handling the equipment.

Handling After Use

✍Do not apply excessive force when disconnecting the cables. Always pull on the connector housing and not on the cable.

✍Clean the unit, accessories, and cables, and keep them together in one place for next use.

✍Always check for adequate supply of disposable accessories such as ECG electrodes. If any shortage, contact our service representative and supply as necessary.

Handling the Display Panel

✍The display panel utilizes exclusive fluorescent light for the backlight.
As this fluorescent light tube has product life cycle, it needs to be replaced periodically. If the display becomes dark, scintillates, or does not light, contact your nearest service representative.

✍The LCD used for the display panel utilizes highly accurate picture elements of pixels over 99.99%, but there may be an absence (less than 0.01%) or constant lighting of pixels.

This section describes about the storage of the device and recording paper.

Storing the Device

✍Store in a place where the device will not be exposed to splashing water.
✍Store in a place where the device will not be adversely affected by atmospheric pressure, temperature, humidity, ventilation, sunlight, dust or atmosphere containing salt or sulfur.
✍Store in a level area where the device is not exposed to vibration and shock (including during transportation).
✍The following environmental conditions should be observed when storing the device.

Storage Temperature : −10～60?C
Storage Humidity : 10～95% (at 60?C)

Storing the Recording Paper

The DS-7100 system utilizes heat sensitive recording paper. If placed in a high temperature for long period of time, the print may become indistinct, and unable to read. When storing, follow the precautions below.

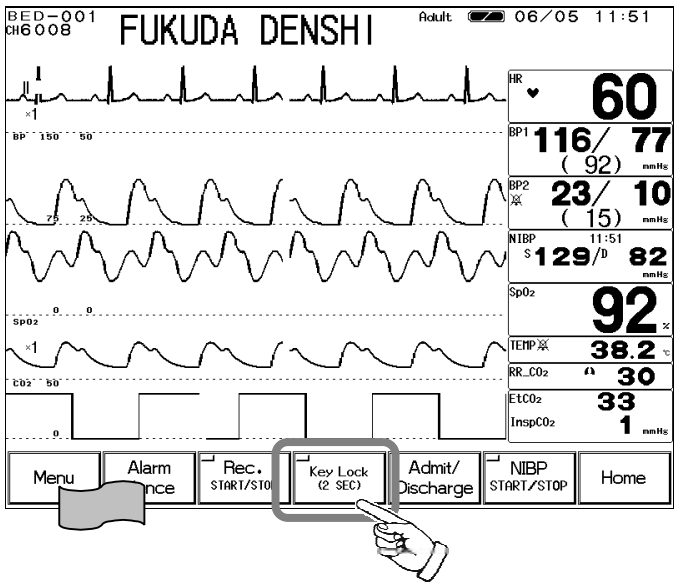
✍Store in a place where light is shut off and avoid direct sunlight.
✍Do not leave the paper in a high temperature (50 °C or 122 °F or above).
✍Do not store the paper in polyvinyl chloride bag.
✍Do not expose the paper to alcohol, hydrochloric acid, or ester ketone.
✍Avoid using adhesive agents other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

This chapter explains about the cleaning of the device and sensors.

Cleaning the Display Panel

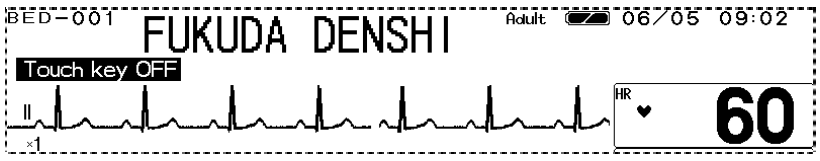
Since this device incorporates a touch screen, finger prints and other stains are likely to appear on the display panel.
Follow the procedure below to clean the display panel.

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



Reference	The [Key Lock key] needs to be preprogrammed as user key. Refer to " 8. System Configuration Ward Setup" for user key setup.

2. Clean the touch panel.



While the "Touch key OFF" message is displayed, the touch panel key will be deactivated.
If "LEAD OFF" or other message is displayed, the key lock message will not be displayed.

3. Wipe the touch panel using cleaning cloth.

4. Press again the [Key Lock] key for more than 2 seconds.
The message will disappear and the keys will be activate again.

⚠CAUTION	✍ Do not clean the touch panel using strong acid. ✍ A special coating is applied to the surface of the touch panel. Wipe the surface with the soft cleaning cloth provided as optional accessory or with commercially available eyeglass cleaning cloth.

Cleaning the Housing

Clean the housing using tightly squeezed gauze or an absorbent cotton cloth dampened with alcohol or a neutral cleanser.

⚠CAUTION	✍ 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 or cleaning solution to enter the monitor 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 monitor 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, 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.

Disinfecting the Blood Pressure Transducers

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

Disinfecting the Temperature Probes

Disinfect the Temperature Probes according to the manufacturer's guidelines.

Disinfecting the CO_2 Filter Line

Disinfect the Filter Line/Capno Line according to the manufacturer's guidelines.

Cleaning and Disinfecting the SpO_2 Transducer

✍Do not soak the sensor in water or antiseptic solution.

✍Wipe the DURASENSOR with disinfectant such as 70% alcohol. Do not disinfect by applying radioactive rays, steam, or ethylene oxide.

✍OXISENSOR is a disposable sensor. Do not reuse or attempt resterilization.

Cleaning and Disinfecting the NIBP Cuff

✍Do not soak the sensor in water or antiseptic solution.

✍Wipe the NIBP cuff with disinfectant such as 70% alcohol. Do not disinfect by applying radioactive rays, steam, or ethylene oxide.

Cleaning and Disinfecting the ECG lead Cable

✍Do not soak the sensor in water or antiseptic solution.

✍Wipe the ECG lead cable with disinfectant such as 70% alcohol. Do not disinfect by applying radioactive rays, steam, or ethylene oxide.

This section describes about the handling and storage of the battery pack.

Handling the Battery

✍The battery pack can be continually used for more than 300 times (or about 1 year) under normal temperature, but the continuous use will degrade the battery and shortens the usable time.

✍When the battery operation time becomes short even after it is fully charged, the battery pack needs to be replaced.

✍When the charge time of the battery pack becomes short, the battery pack needs to be replaced.

✍When the battery pack level becomes low, charge the battery well in advance for the next use.

Storing the Battery

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

Storage Temperature and Humidity

✍Store in an environment specified below without corrosive gas.

Storage Period	*Storage Temperature*	*Storage Humidity*
Within 30days	−20～60?C	65?20%
30 days～90 days	−20～45?C	
90 days～1year	−20～35?C	

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

Long-term Storage

✍If left installed in the monitor for long period of time, the electrolyte may leak, or inactivate the battery which degrades the capacity recovery after storage. Therefore, always remove the battery from the monitor when storing for long period of time. Contact our service representative when removing the battery.

This section explains the daily check and periodic check items of the device.

About the Maintenance Check

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

To ensure safety, reliability, and high performance, a “Daily Check” and “Periodic Inspection” must be performed. We are not liable for any accident arising from lack of maintenance.

⚠CAUTION	✍ Do not open the housing of this device. ✍ Avoid alcohol or other liquids from getting into the equipment.

●Daily Check

Perform daily inspection using the “Daily Check List” on the next page.

●Periodic Check

Periodic inspection of medical electronic equipment is mandatory to prevent failures and accidents and to ensure safety and reliability.

Periodic maintenance may be performed by each medical institution or by a third party by concluding a “Maintenance Contract”.

For more details, contact your nearest service representative.

Time-Change Components

To ensure reliability of safety, function, and performance of this device, the time-change components must be replaced periodically. When replacing, contact our service representative.

$EtCO_2$ Unit	Replacing Period: 7,000 hours (approx. 10 months of continuous use)
LCD Unit, Inverter Unit	Replacing Period: 50,000 hours or 6 years
NIBP Unit	Replacing Period: 100,000 times of use or 6 years
Short Term Backup Battery	Replacing Period: 4 years～6 years according to the used frequency
Long Term Backup Battery	Replacing Period: 6 years
Battery Pack	Replacing Period: 1 year or 300 times of charging / discharging.

⚠CAUTION	The time-change components must be replaced at specified period.

Daily Check List

No. _____

Inspected Date _____ Inspected by _____ Location _____

Device Type _____ Serial No. _____ Date of Purchase _____

Item	*Details*	*Criteria*	*Judgement*
Appearance	Visually check the exterior for scratches, cracks, deformation, and rust.	No abnormality should be found.	☐OK / ☐NG
Installation	Check whether the unit is installed on a level surface.	The installation area must be level and free from vibration and shock.	☐OK / ☐NG
	Check whether the unit is installed in a place susceptible to adverse environment.	The environmental condition (ex. temperature, humidity) of the installed place should be as specified. The unit should not be subjected to splashing water.	☐OK / ☐NG
Functions	Turn ON the monitor, and check whether it operates normally.	The home display appears, and the lamp located at the right side of the display panel lights.	☐OK / ☐NG
		The date and time should be correct.	☐OK / ☐NG
Cables	Visually check all cables for any damage.	No damage should be found.	☐OK / ☐NG
Periodic Inspection	Check the date of previous periodic inspection.	Should be within 1 year.	☐OK / ☐NG
CO_2 Calibration (DS-7141)	Check the date of previous calibration date. Previous Date Day_____ Year_____ Month____	Should be within 6 months.	☐OK / ☐NG

Comment

— Troubleshooting —

This section explains the troubleshooting for each case.

ECG

The “LEAD OFF” message is displayed.

Cause : The electrode is detached, or is not making good electrical contact with the skin.
Solution : • Check if the electrodes are properly attached.
• Replace the electrode, or check the lead cable.

The “ECG failed” message is displayed.

Cause 1 : The ECG amplitude is 0.25mV or below for the waveform size of ×1, ×1/2, ×1/4, and 0.150mV or below for the waveform size of ×2, ×4.
Solution : Change the electrode attachment site, or select the lead with higher QRS amplitude.
Note : Using 4-electrode or 5-electrode instead of 3-electrode allows more accurate QRS detection.

Cause 2 : The electrode contact is poor.
Electrical blanket or other noise source is near the patient.
Solution : Attach the electrode firmly.
- Replace the lead cable if defective.
- If any noise source is near the patient, locate it away from the patient as much as possible.

ECG waveform contains noise.
The “Artifact” message is displayed.

Cause 1 : The electrode contact is poor.
Electrical blanket or other noise source is near the patient.
Solution : Attach the electrodes firmly.
- Replace the lead cable if defective.
- If any noise source is near the patient, locate it away from the patient as much as possible.

Cause 2 : EMG is interfering.
Solution : • Change the electrode site to a location where EMG will less likely to interfere.
• Select ESIS mode for the filter mode.
Note : Selecting a ESIS mode for the filter mode will decrease the QRS amplitude and may result in not counting the heart rate.

The “Check electrode” message is displayed.

Cause : The electrode contact with the skin is poor. There is substantial contact resistance between the electrodes.
Solution : Replace all the electrodes.
Use the electrodes of the same type.

The “ECG unit error” message is displayed.

Cause : A communication error with the ECG measuring unit exists.
Solution : The breakage of wire or failure of the ECG unit can be considered.
Contact our service representative.

The measured data is displayed as "×××".

Cause : The heart rate is outside the measurement range.
Solution : • Check the electrode application.
• Replace the electrode, or check the lead cable.

Heart rate is not counted. Heart rate is low.

Cause : The ECG waveform amplitude is below the QRS detection level (0.3mV).
Solution : Change the electrode site, or select a lead with higher QRS amplitude.
Note : Using 4-electrode or 5-electrode instead of 3-electrode allows more accurate QRS detection.
Also, if large amount of noise is interfering, the noise may be erroneously detected as QRS. It is recommended to change the electrode site and increase the ECG amplitude.

Heart rate is not counted, and "LEAD OFF" message is displayed.

Cause : The electrode of the displayed lead type is detached, or is not making good electrical contact with the skin.
Solution : • Check the electrode application.
• Replace the electrode, or check the lead cable.

Artificial pacemaker is not displayed.

Cause : On the admit / discharge menu, [Not used] is selected for the pacemaker use.
Solution : Select [Used] for the pacemaker use.

The "Pacemaker error" message is displayed.

Cause : The pacemaker pulse is detected 16 pulses or more per second.
Solution 1 : Attach the electrodes firmly.
• Replace the lead cable if defective.
• If any noise source is near the patient, locate it away from the patient as much as possible.
Solution 2 : If the patient is not wearing a pacemaker, set to [Not used] for the pacemaker use in the patient admit/discharge menu.

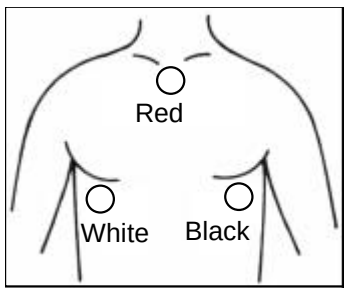
The "ECG not connected" message is displayed.

Cause : When the ECG relay cable is disconnected during ECG monitoring, this message will be displayed.
Solution 1 : To cease monitoring, press the [Alarm Silence] key to clear the message and silence the alarm.
Solution 2 : To continue monitoring, plug in the ECG relay cable. This will clear the message and silence the alarm.

Respiration

The "CVA detected" message is displayed.

Cause : Heartbeat is interfering and superimposed on the respiration waveform.
Solution : Place the electrode as shown below where the heartbeat will be less likely to interfere.



"0" is displayed for respiration rate, or apnea alarm is generated.

Cause : The respiration waveform amplitude is below the detection level (0.2O).
Solution : Change the electrode site.

The respiration waveform and respiration rate is not displayed.

Cause 1 : The ECG relay cable designed for electrosurgical knife is used.
Solution : The impedance respiration can not be measured if the cable designed for electrosurgical knife is used. Use the standard ECG relay cable if not using the electrosurgical knife.

Cause 2 : The impedance respiration measurement is ceased.
Solution : Turn ON the impedance respiration measurement on the admit / discharge menu or RESP configuration menu.
Note : If the pacemaker with the minute ventilation measuring function is used, turn OFF the impedance respiration measurement. Otherwise, both the pacemaker and the monitor will not be able to perform accurate measurement.

The measured data is displayed as "×××".

Cause : The respiration rate is outside the measurement range.
Solution : • Check the electrode application.
• Replace the electrode, or check the lead cable.

Invasive Blood Pressure

The "BP1 Transducer OFF", "BP2 Transducer OFF" message is displayed.

Cause : The transducer for BP1 or BP2 is not connected.
Solution : Connect the transducer.

The "BP1 not zero balanced", "BP2 not zero balanced" message is displayed.

Cause : The BP zero balance has not been performed since the power is turned ON.
Solution : Open the three-way cock of the transducer to air and perform zero balance.

The measured data is displayed as "- - -".

Cause : The BP zero balance has not been performed since the power is turned ON.
Solution : Open the three-way cock of the transducer to air and perform zero balance.

BP value and waveform are not displayed properly.

Cause : Blood pressure line has not been zero balanced.
Solution : Open the three-way cock of the transducer to air and perform zero balance.

The measured data is displayed as "×××".

Cause : The BP value is outside the measurement range.
Solution : Perform zero balance again.

The "BP not connected" message is displayed.

Cause : When the BP interface cable or 2ch BP conversion cable is disconnected during BP monitoring, this message will be displayed.
Solution 1 : To cease monitoring, press the [Alarm Silence] key to clear the message and silence the alarm.
Solution 2 : To continue monitoring, plug in the BP interface cable or 2ch BP conversion cable. This will clear the message and silence the alarm.

The "Incorr. BP cable" message is displayed.

Cause : The cable other than 2ch BP conversion cable is plugged in to the BP connector.
Solution : Use the 2ch BP conversion cable.

SpO_2

The "Check SpO_2 sensor" message is displayed.

Cause : Sensor is detached from the patient.
Solution 1 : Check if the sensor part is properly attached to the patient.
Solution 2 : Check if the light emitting part and light receiving part of the sensor LED is aligned.

The "Pulse search" message is displayed.

Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.
Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

The "No pulse detect" message is displayed.

Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.
Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

The "Motion Artifact" message is displayed.

Cause : There is excessive body motion of the patient.
Solution : Change the sensor position where the body motion will have less effect.

The pulse waveform is not displayed, or interrupted

Situation : " Check SpO_2 sensor " is displayed.
Cause 1 : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.
Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

Cause 2 : Sensor is defective.
Solution : Replace the sensor.

Cause 3 : SpO_2 sensor is not firmly connected to the SpO_2 input connector.
Solution : Make sure the SpO_2 sensor is securely connected.

Cause 4 : Sensor is exposed to light.
Solution : Place a black or dark cloth over the sensor to avoid direct sunlight. Also when not used, avoid placing the sensor in light or unplug the sensor from the connector.

The SpO_2 measurement is unstable.

Cause : There is excessive body motion of the patient which disables correct measurement.
Solution : 1. Have the patient lie still as much as possible.
2. Relocate the sensor, or change the sensor to which the body motion will have less influence.

The "SpO_2 unit error" message is displayed.

Cause 1 : There is a failure of communication with the SpO_2 measurement unit.
Solution : Breaking of wire or SpO_2 unit failure can be considered.
Contact our service representative.

Cause 2 : Sensor is defective.
Solution : Replace the sensor.

The "SpO_2 sensor fault" message is displayed.

Cause : Sensor is defective.
Solution : Replace the sensor.

The "SpO_2 not connected" message is displayed.

Cause : When the SpO_2 relay cable is disconnected during SpO_2 monitoring, this message will be displayed.
Solution 1 : To cease monitoring, press the [Alarm Silence] key to clear the message and silence the alarm.
Solution 2 : To continue monitoring, plug in the SpO_2 relay cable. This will clear the message and silence the alarm.

Non-Invasive Blood Pressure

The cuff is not inflated although the pump is operating.

Cause1 : The air hose is not firmly connected, and the air is leaking.
Solution : Check if the air hose is properly connected.

Cause 2 : The cuff size is not corresponded to the selected patient type.
Solution : Check if the cuff size is corresponded to the selected patient type.

The monitor repeats the measurement, or "- - -" is displayed for the numeric data.

Cause 1 : The measurement accuracy is not reliable due to body motion artifact.
Solution : Have the patient stay still as much as possible during the measurement.

Cause 2 : The pulse is too small to acquire reliable measurement accuracy.
Solution : Check if the cuff application is proper, and if the cuff size is corresponded to the selected patient type.

The "Check NIBP hose" message is displayed.

Cause : The applied pressure to the cuff has exceeded the maximum limit. The measurement time has exceeded the maximum limit.
Solution : Check if the cuff application is proper, if the cuff size is corresponded to the selected patient type, or if the air hose is not bent. After checking the above, perform the measurement again.
If the same message is displayed again, a failure of the equipment can be considered. Cease the measurement, and contact our service representative.

The “NIBP unit error” message is displayed.

Cause : The zero balancing before the measurement has failed, and measurement could not be started.

Solution : The body movement or other artifact may cause zero balance failure. During the measurement, have the patient stay still as much as possible.
If the same message is displayed again, the failure of the equipment can be considered. Cease the measurement, and contact our service representative.

The time of measurement disappears and the numeric data is displayed as “- - -”.

Cause : The NIBP data will be erased when the preprogrammed NIBP erase time has elapsed.

Solution : Select the appropriate time for NIBP data erase time from 10min, 30min, 60min, 24hrs which best fits the monitoring purpose.

Temperature

The “Wrong Temp Probe” message is displayed.

Cause 1 : The YSI-700 is used.

Solution : Use the YSI-400 temperature probe for measurement. The YSI-700 can not be used with the DS-7100 series.

Cause 2 : There is a contact failure of the temperature probe.

Solution : Check if the temperature probe is properly inserted.

The numeric data is displayed as “×××”.

Cause : The temperature measurement is outside the measurement range.

Solution : Check if the temperature probe is properly inserted.

The “TEMP not connected” message is displayed.

Cause : When the temperature sensor is disconnected during temperature monitoring, this message will be displayed.

Solution 1 : To cease monitoring, press the Alarm Silence key to clear the message and silence the alarm.

Solution 2 : To continue monitoring, plug in the temperature sensor. This will clear the message and silence the alarm.

The “TEMP auto check” message is displayed. The numeric data is displayed as “- - -”.

Cause : The temperature is calibrated once every hour on this monitor. During calibration, the numeric data will be displayed as “- - -”.

Solution : The calibration will complete in 10 seconds. If the calibration does not complete within 10 seconds, cease the measurement and contact our service representative.

The “TEMP unit check” message is displayed.

Cause : Error is detected during temperature calibration.

Solution : A unit failure can be considered. Cease the measurement and contact our service representative.

CO_2 Concentration

The "Check filter line" message is displayed.

Cause : The sampling tube is clogged.
Solution : Replace the sampling tube.

The "Self-diag CO_2" message remains displayed.

Cause : An error has occurred to the self-check procedure at power ON.
Solution : The CO_2 unit failure can be considered.

The "Initializing CO_2" message does not disappear.

Cause : An error has occurred during the initialization at power ON.
Solution : The CO_2 unit failure can be considered.

The "Check CO_2 unit" message is displayed.

Cause 1 : The exhaust connector is clogged.
Solution : After checking the exhaust system and removing the clog, press the "Restart CO_2" key on the CO_2 configuration menu.

Cause 2 : The sampling tube or nasal prong is clogged.
Solution : After checking the inhalation system and removing the clog, press the "Restart CO_2" key on the CO_2 configuration menu.

Cause 3 : The CO_2 unit needs to be replaced.
Solution : Contact our service representative.

The "CO_2 unit error" message is displayed.

Cause : There is a communication error with the CO_2 unit.
Solution : The break of wire or CO_2 unit failure can be considered.
Contact our service representative.

There is substantial measurement error.

Cause 1 : 20 minutes have not yet elapsed since the power is turned ON.
Solution : For 20 minutes from turning ON the power, there will be a substantial measurement error.

Cause 2 : The calibration is not properly performed.
Solution : Perform CO_2 calibration again.

The "CO_2 not connected" message is displayed.

Cause : When the filter line is disconnected during CO_2 monitoring, this message will be displayed.
Solution 1 : To cease monitoring, press the Alarm Silence key to clear the message and silence the alarm.
Solution 2 : To continue monitoring, plug in the filter line. This will clear the message and silence the alarm.

Recorder

No recording is performed.

Situation : The “Paper Out” message is displayed on the upper left of the screen.
The “Paper Out” message is displayed on the [Rec. START/STOP] key.
Cause : There is no recording paper in the recorder magazine.
Solution : Install a new pad of paper into the paper magazine.

Situation : The “Magazine Open” message is displayed.
Cause : The paper magazine is open.
Solution : Close the magazine.

Situation : The “Paper jammed” message is displayed.
Cause : The paper is jammed.
Solution : Open the magazine and install the paper correctly.

Situation : No message is displayed, but recording can not be performed.
Cause : The recording paper is not correctly installed. The front and backside of the paper is set oppositely.
Solution : The “END” printed side of the paper should be facing down in the magazine.

The second waveform and third waveform are not recorded.

Situation : The second waveform and third waveform are not recorded for manual recording or alarm recording.
Cause : The second waveform and third waveform are not set on the recording setup menu.
Solution : Set the second waveform and the third waveform on each recording setup menu.

The “Recorder error” message is displayed.

Cause : The thermal head temperature has increased.
Solution : A damage to the thermal head can be considered.
Contact our service representative.

Telemetry

The “Telemetry unit error” message is displayed.

Cause : There is a communication error with the telemetry transmission unit.
Solution : The breaking of wire or telemetry transmission unit failure can be considered.
Contact our service representative.

There is no reception at the telemetry center.

Cause : The channel ID or group ID is not corresponded with the telemetry receiver.
Solution : Set the correct channel ID and group ID.

The BP waveform of 100mmHg or above can not be properly received.

Cause : The BP waveform and scale is not corresponded.
Solution : When BP waveform is above 100mmHg, set the BP scale above 100mmHg.

General

Nothing is displayed but the main power indicator is lighted.

Cause : A system error has occurred.
Solution : Turn off the power, unplug the power cable, and contact our service representative.

The “Adjusting” message is displayed. Numbers are displayed large on the display.

Cause : This is the test mode. Stop using the device immediately.
Solution : Restart the system. The test mode will be cancelled.
If the same situation is observed again, contact our service representative.
Turn off the DIP switch No.1.

The data is initialized each time the power is turned ON.

Cause 1 : The internal switch is set to initialize.
Solution : The internal switch setting needs to be changed. Contact our service representative.
Set the rotary switch to 0.

Cause 2 : The battery for backup memory is depleted.
Solution : The battery needs to be replaced. Contact our service representative.

The display is not clear.

Cause 1 : The display brightness is not adjusted.
Solution : Due to the LCD display characteristic, the visible range is limited. Adjust to the appropriate brightness.

Cause 2 : The monitor is set to the night mode.
Solution : Cancel the night mode.

The system does not start although the power switch is turned ON.

Cause 1 : The power cable is not connected.
The battery is not charged.
Solution : Turn off the power and connect the power cable. If the battery is not charged, use the power cable until the battery charging is complete.

Cause 2 : Incorrect IC card is inserted.
Solution : Turn off the DIP switch No.8.

The clock is often delayed.

Cause : The battery for the backup memory is depleted. Check if the time is delayed when the power is turned off.
Solution : The battery needs to be replaced. Contact our service representative.

Battery

The operation time is short although the battery is charged.

Cause 1 : The battery life has expired.
Solution : The battery pack is a consumable product. Replace it once a year.

Cause 2 : The ambient temperature is too high or too low.
Solution : For safety, the charging operation will be in a standby mode when the battery pack temperature becomes excessively high or low.
The charging will automatically resume when appropriate temperature is reached.
Charge the battery in an ambient temperature of 10～30?C.

The charge lamp on the patient monitor does not light.

Cause 1 : The AC power cable is disconnected.
Solution : Plug in the AC power cable.
The battery pack can be charged only during the AC operation.

Cause 2 : The battery pack is not installed.
Solution : The battery pack is optional. If a battery pack is required, contact our service representative and install the battery pack.

Cause 3 : The battery life has expired.
Solution : The battery pack is a consumable product. Replace it once a year.

During the charging procedure, the charge lamp (orange) does not switch to charge complete status (green) and extinguishes.

Cause 1 : The battery pack temperature is too high or too low.
Solution : For safety, the charging operation will be in a standby mode when the battery pack temperature becomes excessively high or low.
The charging will automatically resume when appropriate temperature is reached.

Cause 2 : The breakdown of battery pack can be considered.
Solution : If the charging operation does not complete within the specified charging time, the charging operation will cease for safety purpose.
Contact our service representative and replace the battery pack.

Cause 3 : The battery life has expired.
Solution : The battery pack is a consumable product. Replace it once a year.

The “Charge battery” message is displayed.

Cause : The AC power cable is disconnected.
Solution : Plug in the AC power cable.
The battery pack can be charged only during the AC operation.

Chapter 11

Technical Information

— Specification/Performance — ····· 2
Specification ····· 2
Performance ····· 3
— Setup Item — Default and Backup ····· 5
Patient Admit / Discharge ····· 5
Alarm Setup ····· 5
Parameter Setup ····· 6
Review Function Setup ····· 7
System Configuration Setup ····· 8
Display Mode Setup ····· 12
Alarm Mode Setup ····· 13
— External Connection — Pin Assignments ··· 14
Serial Connector Output Signal ····· 14
Status I/O Signal ····· 14

― Specification/Performance ―

This section states the specification and performance of this equipment.

Specification

Size

260 (W) ×197 (D) ×264 (H) mm (not including the protrusion)

Weight (not including the battery)

DS-7141 : 5.3kg
DS-7101L : 5.1kg
DS-7101LT : 5.2kg

Environmental Condition

Operating Temperature : 10～40?C
Operating Humidity : 30～85% (without condensation)
Transport / Storage Temperature : ―10～60?C
Transport / Storage Temperature : 10～95% (at 60?C)

Safety

General Standard : EN60601-1:1990
(Medical electrical equipment – Part 1: General requirements for safety)
Amendment A1 to EN 60601-1:1993
Amendment A2 to EN 60601-1:1995

EMC Standard : IEC 60601-1-2:1993
(Medical electrical equipment―Part 1: General requirements for safety
―2.Collateral standard:
Electromagnetic compatibility ―requirements and
tests. IEC 601-1-2:1993)

Withstand Voltage : Class I, Type CF

Power Requirements

Voltage	AC100～240V ?10%	DC14V ?10%
Frequency	50/60Hz	?
Power Consumption	82VA	60W

Performance

Display

Device	: 8.4 inch TFT Color LCD
Control	: Touch Screen Type
Waveform Trace	: Stationary Trace
Waveform Speed	: ECG / SpO_2 / BP (6.25mm/s, 12.5mm/s, 25mm/s) RESP / CO_2 (6.25mm/s, 12.5mm/s, 25mm/ s)
Parameter	: ECG, RESP, TEMP, SpO_2 (Arterial Oxygen Saturation), BP1, BP2, NIBP, CO_2 concentration

Recording

Recording Method	: Thermal Array Type
Recording Speed	: 25mm/s
Recording Waveform	: Max. 3 waveforms
Recording Width	: 50mm

Operation

Touch Screen	: Eight-Wire Resistive Analog Touch Screen

ECG

Lead Type	: Wired 3-electrode, 4-electrode, 5-electrode
Frequency Characteristic	: 40Hz / 15Hz
Input Impedance	: 5M? or above
Max. Input Voltage	: ±10mV
Polarization Voltage	: ±825mV or above
Common Mode Rejection Ratio	: 80 dB or above
HR Measurement Range	: Adult 0, 12～300bpm±3% or ±5bpm Neonate 0, 30～300bpm±3% or ±5bpm
Waveform Size Selection	: 1/4, 1/2, 1, 2, 4
Defibrillation Proof	: Provided

Respiration

Method	: Impedance Method
Frequency Characteristic	: 1.5Hz (adult, child) / 2.5Hz (neonate)
Current	: 100μA or lower
Measurement Range	: 0, 4～150Bpm±5Bpm

Temperature

Method	: Thermistor Method
Probe	: only YSI-400 series
Measurement Range	: 0～50?C±0.2?C
No. of Channel	: 1 channel

SpO_2 (Arterial Oxygen Saturation)

Method	: 2 Wavelength Pulse Wave Method
Measurement Range	: 0%～100%
Resolution	: 1%
Accuracy	: Adult at 70～100% ±2% at 0～69% not specified Neonate at 70～100% ±3% at 0～69% not specified
Measurement Range	: 20～250bpm±3bpm

Blood Pressure

Transducer Sensitivity	: 5μV / V / mmHg
Measurement Range	: －50～300mmHg
Frequency Characteristic	: DC～6Hz / 8Hz / 12Hz / 40Hz
Accuracy	: ±2% of full scale or within ±1mmHg
Zero Balance Range	: within ±150mmHg
Measurement Range	: Adult 20～300bpm±3%
	Neonate 30～300bpm±3%
Channel	: 2 channels

Non-Invasive Blood Pressure

Method	: Oscillometric Method
Measurement Range	: 10～280mmHg
Resolution	: 1mmHg
Accuracy	: ±4mmHg
Measurement Range	: 40～240bpm±5%

CO_2 Concentration (DS-7141)

Method	: Infra-Red Solid-State Method, Microstream Method
Measurement Range	: 0～99mmHg
	0-20min
	0～38mmHg:±4mmHg
	39～99mmHg:±12%
	20min. and up
	0～38mmHg:±2mmHg
	39～99mmHg:±5%
RR Measurement Range	: 0～150bpm
	0～40bpm:±1bpm
	41～70bpm:±2bpm
	71～100bpm:±3%
	101～150bpm:±5%
Flow Rate	: 50±7.5 ml/min
System Response Time	: 2.9 seconds (Typical)
Delay Time	: 2.7 seconds (Typical)
Rise Time	: 190 msec (maximum)

Telemetry (DS-7141, DS-7101LT)

Transmission Freq.	: 608~614 MHz
	Exact frequency depends on the destination.
RF Output Power	: -15dBm Standard, 0dBm MAX
Channel Spacing	: 12.5 kHz
Modulation Mode	: Digital, Frequency Shift Keying (FSK)

This section lists selection, default setting, and backup status for each setup item.
Backup Item

"○" : Setup item will be retained even when the power is turned OFF.

"△" : Setup item will be retained even when the power is turned OFF. When discharging procedure is performed, the value will be reset to initial setting.
The alarm setup will be reset to initial setting with the selected alarm mode.

"—" : Setup item will be reset to initial setting when the power is turned OFF.

Patient Admit / Discharge

Item		*Selection*	*Default*	*Backup*
Patient Name		Numeric, Alphabet, Symbol (16 characters)	Blank	△
Sex		Male, Female	Undetermined	△
Age		0～150 years or 0～999 days	0 year	△
Birth Date		Birth Date (Year, Month, Day)	Blank	△
ID		Numeric, Alphabet, Symbol (10 characters)	Blank	△
Patient Type		Adult, Child, Neonate	Adult	○
Pacemaker		Used, Not used	Not used	△
Impedance Measurement		ON, OFF	ON	△
Filter Mode		Monitor, ST Display, ESIS	Monitor	○
Room/Bed ID	Bed ID	0～999	0	○
	Room ID	Numeric, Alphabet, Symbol (4 characters)	BED—	○

Alarm Setup

Item	*Selection*	*Default*	*Backup*
System Alarm	Suspend, ON	Suspend	○/△
HR	ON, OFF 20—300bpm	ON 40—120	
AYSTOLE	ON, OFF 3—10 sec.	ON 5 sec.	
VF	ON, OFF	ON	
VT	ON, OFF	ON	
SLOW_VT	ON, OFF	ON	
RUN	ON, OFF 2—8 beats	ON 3 beats	
COUPLET	ON, OFF	OFF	
PAUSE	ON, OFF 1.5—5 sec.	OFF 2 sec.	
BIGEMINY	ON, OFF	OFF	
TRIGEMINY	ON, OFF	OFF	
FREQUENT	ON, OFF 1—50 beats / min.	OFF, 10 beats	
TACHY	ON, OFF 20—300	ON	
BRADY	ON, OFF 20—300	ON	
ST	ON, OFF ST1 ±2.0mV / ±20mm ST2 ±2.0mV / ±20mm	OFF	
BP1 (mmHg)	ON, OFF 0—300mmHg	ON SYS 80—180 DIA OFF—OFF MEAN OFF—OFF	
BP1 (kPa)	ON, OFF 0—40.0kPa	ON SYS 10.0—24.0 DIA OFF—OFF MEAN OFF—OFF	

Item	Selection	Default	Backup
BP2（mmHg）	ON, OFF　0－300mmHg	ON SYS　OFF－OFF DIA　OFF－OFF MEAN　OFF－OFF	○/△
BP2（kPa）	ON, OFF　0－40.0kPa	ON SYS　OFF－OFF DIA　OFF－OFF MEAN　OFF－OFF	
RR	ON, OFF　5－150Bpm	ON　5－30	
APNEA	ON, OFF　5－20sec.	ON　15sec.	
SpO_2	ON, OFF　50－100%	ON　90－OFF	
NIBP (mmHg)	ON, OFF　10－300mmHg	ON SYS　80－180 DIA　OFF－OFF MEAN　OFF－OFF	
NIBP (kPa)	ON, OFF　1.5－40.0kPa	ON SYS　10.0－24.0 DIA　OFF－OFF MEAN　OFF－OFF	
TEMP	ON, OFF　30－50?C	OFF　OFF－OFF	
$EtCO_2$ (mmHg)	ON, OFF　1－100mmHg	ON　30－45mmHg	
$EtCO_2$ (kPa)	ON, OFF　0.1－13.3kPa	ON　4.0－6.0kPa	
$EtCO_2$ (%)	ON, OFF　0.1－13.3%	ON　4.0－6.0%	
$InspCO_2$ (mmHg)	ON, OFF　1－4mmHg	ON　3mmHg	
$InspCO_2$ (kPa)	ON, OFF　0.1－0.4kPa	ON　0.4kPa	
$InspCO_2$ (%)	ON, OFF　0.1－0.4%	ON　0.4%	

NOTE	The alarm setup will be retained even after the power is turned OFF. If discharging procedure is performed, the alarm setup will be initialized with the selected alarm mode.

Parameter Setup

Item		Selection	Default	Backup
ECG	Lead	Ⅰ, Ⅱ, Ⅲ, aVR, aVL, aVF, V	ECG1　Lead Ⅱ ECG2　Lead V	○/△
	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	ECG1　×1 ECG2　×1	△
	Filter Selection	Monitor, ST Display, ESIS	Monitor	○
	HR Source	Auto, ECG, SpO_2, BP	Auto	○
	Automatic Lead Switch	ON, OFF	OFF	○
	Pacemaker Pulse	ON, OFF	ON	○
	HR Average	ON, OFF, Instant, Average	Average	○
	HR Sync. Indicator	ON, OFF	ON	○
	Pace Pulse Mask Time	Auto, 10ms, 20ms, 40ms, OFF	Auto	○
	ECG Drift Filter	ON, OFF	OFF	○
RESP	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	×1	△
	RR Sync. Indicator	ON, OFF	ON	○
	CVA	ON, OFF	OFF	△
	RR Source	Auto, Impedance, CO_2	Auto	○
	Impedance Meas.	ON, OFF	ON	○

Item		Selection	Default	Backup
SpO_2	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	×1	△
	SpO_2 SEC Alarm	OFF, 10, 25, 50, 100	OFF	○
	Ignore NIBP	ON, OFF	ON	○
NIBP	Auto Mode	ON, OFF	OFF	△
	End Tone	ON, OFF	ON	○
	Quick SYS List	ON, OFF	ON	○
	PR	ON, OFF	OFF	○
	Quick SYS	3, 5, 10 min.	10 min.	○
	1-Min. Auto	10, 20 min.	20 min.	○
	Mean	ON, OFF	OFF	○
BP1	Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa	150mmHg 20kPa	○/△
	Filter	6, 8, 12, 40Hz	12Hz	○
	Mean	ON, OFF	OFF	○
BP2	Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa	50mmHg 8kPa	○/△
	Filter	6, 8, 12, 40Hz	12Hz	○
	Mean	ON, OFF	OFF	○
CO_2	Meas. Unit	mmHg, kPa, %	mmHg	○
	$EtCO_2$ Average	10, 20, 30 sec., OFF	10 sec.	○／△
	Scale	50, 100mmHg 4, 8, 10kPa 4, 8, 10%	50mmHg 4kPa 4%	○／△

Review Function Setup

Item		Selection	Default	Backup
Graphic Trend	Parameter	HR, PR, VPC, ST1/ST2, RR, APNEA, SpO_2, BP, NIBP, TEMP, $EtCO_2$ / $InspCO_2$, EVENT1, EVENT2	HR	○
	Duration	1, 2, 4, 8, 12, 24 hours	4 hours	○
	Scale	HR : 100, 200, 300bpm ST : ±0.2, ±0.5, ±1.0, ±2.0mV ±2, ±5, ±10, ±20mm VPC : 20, 50, 100 beats BP1 : 20, 50, 100, 150, 200, 300mmHg 4, 8, 16, 20, 24, 40kPa BP2 : 20, 50, 100, 150, 200, 300mmHg 4, 8, 16, 20, 24, 40kPa NIBP : 100, 150, 200, 300mmHg 16, 20, 24, 40kPa TEMP : 20-45, 30-40?C SpO_2 : 0-100, 50-100, 80-100% RR : 100, 200, 300bpm APNEA : 15, 30 sec. CO_2 : 50, 100mmHg 4, 8, 10kPa 4, 8, 10%	HR : 100bpm ST : ±0.5mV ±5mm VPC : 20 beats BP1 : 150mmHg 20kPa BP2 : 50mmHg 8kPa NIBP : 150mmHg 20kPa TEMP : 30-40?C SpO_2 : 80-100% RR : 50bpm APNEA : 15 sec. CO_2 : 50mmHg 4.0kPa 4.0%	○

Item		Selection	Default	Backup
Tabular Trend	Duration	1, 5, 10, 15, 30, 60 min.	60 min.	○
OCRG	Display Time	4, 8 min.	8 min.	○
	Waveform	Impedance Resp., CO_2	Impedance Resp.	○
Recall	Parameter	ECG1, ECG2, BP, SpO_2, RESP, CO_2	ECG1, ECG2	○
	Alarm Factor	HR/PR/BPR : ON, OFF ST : ON, OFF RR : ON, OFF APNEA : ON, OFF SpO_2 : ON, OFF BP1 : ON, OFF BP2 : ON, OFF NIBP : ON, OFF TEMP : ON, OFF CO_2 : ON, OFF	HR/PR/BPR : ON ST : ON RR : ON APNEA : ON SpO_2 : ON BP1 : ON BP2 : ON NIBP : ON TEMP : ON CO_2 : ON	○
	Arrhythmia Factor	ASYSTOLE : ON, OFF VF : ON, OFF VT : ON, OFF SLOW_VT : ON, OFF RUN : ON, OFF COUPLET : ON, OFF PAUSE : ON, OFF BIGEMINY : ON, OFF TRIGEMINY : ON, OFF FREQUENT : ON, OFF TACHY : ON, OFF BRADY : ON, OFF	ASYSTOLE : ON VF : ON VT : ON SLOW_VT : ON RUN : ON COUPLET : ON PAUSE : ON BIGEMINY : ON TRIGEMINY : ON FREQUENT : ON TACHY : ON BRADY : ON	○
ST Meas.	Meas. Point	0～560ms	120ms	○
	Ref. Point	0～－240ms	－80ms	○

NOTE	✍ The graphic trend data, tabular trend data will be retained even after the power is turned OFF. ✍ The ST data, OCRG data, recall data will be retained until 5 minutes after the power is turned OFF.

System Configuration Setup

●Volume Setup

Item		Selection	Default	Backup
Volume	Pulse	16 levels	Level 8 from left	○
	Key	16 levels	Level 10 from left	○
	Alarm	16 levels	Level 10 from left	○
	Other Bed	16 levels	Level 10 from left	○
	Others	16 levels	Level 8 from left	○

●Display Configuration

Item		Selection	Default	Backup
Display Configuration	No. of waveforms	0～6 waveforms	3 waveforms	○／△
	No. of numeric data	0～7 numeric data	4 numeric data	
	Displayed waveform	ECG1, ECG2, BP, SpO_2 RESP, CO_2	ECG1, SpO_2, RESP	
	Displayed numeric data	HR, BP, NIBP, SpO_2 RESP, RR, CO_2, VPC/ST	HR, NIBP, SpO_2, RR	
	Enlarged Display	ON, OFF	OFF	
	Short Trend	ON, OFF, Overlap	OFF	

NOTE	By selecting ON for backup at discharge, the setup item will be stored even after discharge. Selecting OFF will initialize the display configuration to the initial setting of the selected display mode.

●System Configuration Menu

Item		Selection	Default	Backup
Manual Recording	Wave Select	ECG1, ECG2, BP, SpO_2 RESP, CO_2	ECG1, BP, RESP	○
	Rec. Duration	24 sec., Continuous	24 sec.	○
	Delay Time	None, 8sec., 16 sec.	8 sec.	○
Alarm Recording	Alarm Record	ON, OFF, Center	OFF	○
	Wave Select	ECG1, ECG2, BP, SpO_2 RESP, CO_2, Alarm Factor	ECG1, Alarm Factor	○
	Rec. Duration	12, 24 sec.	12 sec.	○
	Alarm Factor	HR (HR / PR / BPR) Numeric Data, Arrhythmia	HR (HR / PR / BPR) Arrhythmia	○
	Arrhythmia Record	ASYSTOLE, VF, VT, SLOW_VT, RUN, COUPLET, PAUSE, BIGEMINY, TRIGEMINY, FREQUENT, TACHY, BRADY	ASYSTOLE, VF, VT, SLOW_VT, RUN, TACHY, BRADY	○
Periodic Recording	Periodic Record	ON, OFF, Center	OFF	○
	Wave Select	ECG1, ECG2, BP, SpO_2, RESP, CO_2	ECG1, BP, RESP	○
	Rec. Duration	6, 12, 24 sec.	12 sec.	○
	Periodic Interval	5, 10, 15, 30, 60 min.	60 min.	○
Rec. Operation	Paper Feed to Top	ON, OFF	OFF	○
	Paper Feed to End	ON, OFF	ON	○
	QRS Classification	ON, OFF	ON	○
Sweep Speed	ECG, BP, SpO_2	25, 12.5, 6.25mm/s	25mm/s	○
	RESP, CO_2	25, 12.5, 6.25mm/s	6.25mm/s	○
Night Mode	Mode	Manual, Auto	Manual	○
	Start Time	00:00～23:59	22:00	○
	Complete Time	00:00～23:59	7:00	○
	Display	Time Disp. Only, Slightly Dark, Dark	Dark	○
	Volume	No change, Quiet, Very quiet, Silence	Very quiet	○
	Alarm Pole	ON, OFF	OFF	○

Item		Selection	Default	Backup
Color	ECG	32 colors	Green	○
	ST		Green	○
	VPC		White	○
	PACE		White	○
	BP1		Red	○
	BP2		Cyan	○
	NIBP		Cyan	○
	SpO_2		Yellow	○
	TEMP		Orange	○
	RESP		White	○
	CO_2		Cyan	○
	ST2 (Trend)		Orange	Fixed
Alarm Setup	Alarm Suspend	1, 3, 5 min.	3 min.	○
	Alarm Silence	1, 3, 5 min.	3 min.	○

●Hospital Setup

Item		Selection	Default	Backup
AC filter		50, 60Hz	According to Dip_SW	○
Date		07/19, Jul.19, 19.Jul	Jul.19	○
Alarm Mute		ON, OFF	OFF	○
Home Key Function		Home / Enlarge, Home	Home	○
Night Mode Cancel		Any Key, Night Mode Key	Any Key	○
Asystole,VF,VT		ON,ON/OFF	ON	○
Unit	BP	mmHg, kPa	mmHg	○
	TEMP	?C, ?F	?C	○
	ST	mm, mV	mV	○
Telemeter	Channel	0801~0879, 0900~0979, 1000~1079, 1100~1179, 1200~1279, 1300~1379	1100	○
	Group	00～63	00	○

●Ward Setup

Item		Selection	Default	Backup
Trend Clip		ON, OFF	ON	○
BP Record Scale		20, 40mm	40mm	○
HR Low Limit for VT		120, 140bpm	120bpm	○
Password		ON, OFF	OFF	○
Discharge Mode		Admit, Cease	Admit	○
Event Key		ON, OFF	ON	○
Mean Calculation		Waveform, Calculation	Waveform	○
Key Mask	Menu	All Key (excluding system config.)	All Key	○
	System Config.	All Key (excluding pre-set)	All Key	○
	Pre-Set Menu	All Key (excluding ward setup)	All Key	○

Item		Selection	Default	Backup
User Key	Selection	Rec. START/STOP, Alarm Silence, Alarm, Key Lock, NIBP List, Graphic Trend, Tabular Trend, Recall, OCRG, Freeze, NIBP Auto Mode, Size/Lead, HR Source, BP Zero, Admit/Discharge, Night Mode, Display Config., Record, Tone/Volume, Other Bed, ST Display, Cease, Enlarged Display	Alarm Silence, Rec. START/STOP, Size/Lead, Admit/Discharge (from left of display)	○
Alarm Pole	Alarm Pole	ON, OFF	ON	○
	Alarm Level	Level 1 , Level 1 and 2, Level 1, 2, and 3	Level 1	○
	Pattern Setup	Pattern 1～10	Level 1：Pattern 1 Level 2：Pattern 10 Level 3：Pattern 4	○
NIBP Data Erase Time		10, 30, 60min, 24hourr	60min	○

●Monitor Setup

Item		Selection	Default	Backup
Battery Operation		Normal, Power Save	Normal	○
Message Icon		ON, OFF	OFF	○
Parameter Key Frame		ON, OFF	ON	○
Wide AC Filter		ON, OFF	OFF	○
Check Discharge at Power ON		ON, OFF	ON	○
Backup at Discharge		ON, OFF	OFF	○
Status Output Setup	Sync. Sygnal Output	HR, RR	HR	○
		Positive Logic, Negative Logic	Positive Logic	○
	Alarm Output	OFF, APNEA, Level 1, Level 1 and 2, Level 1, 2 and 3	Level 1	○
		Positive Logic, Negative Logic, Pulse	Positive Logic	○

Display Mode Setup

Item		***Default***	***Backup***
Mode Selection		1	○
Mode 1	No. of Waveforms	3 Waveform	○
	No. of Numeric Data	4 Numeric Data	○
	Displayed Waveforms	ECG1, SpO_2, RESP	○
	Displayed Numeric Data	HR, NIBP, SpO_2, RR	○
	Enlarged Display	OFF	○
	Short Trend	OFF	○
	Comment	CONFIG. 1	○
Mode 2	No. of Waveforms	3 Waveforms	○
	No. of Numeric Data	4 Numeric Data	○
	Displayed Waveforms	ECG1, SpO_2, RESP	○
	Displayed Numeric Data	HR, NIBP, SpO_2, RR	○
	Enlarged Display	ON	○
	Short Trend	OFF	○
	Comment	CONFIG. 2	○
Mode 3	No. of Waveforms	4 Waveforms	○
	No. of Numeric Data	6 Numeric Data	○
	Displayed Waveforms	ECG1, BP1/2 (overlap), SpO_2, RESP	○
	Displayed Numeric Data	HR, BP1,BP2, NIBP, SpO_2, TEMP, RR	○
	Enlarged Display	OFF	○
	Short Trend	OFF	○
	Comment	CONFIG. 3	○
Mode 4	No. of Waveforms	4 Waveforms	○
	No. of Numeric Data	6 Numeric Data	○
	Displayed Waveforms	Cascade, BP1/2 (overlap), SpO_2, RESP	○
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO_2, TEMP, RR	○
	Enlarged Display	OFF	○
	Short Trend	OFF	○
	Comment	CONFIG. 4	○
Mode 5	No. of Waveforms	6 Waveforms	○
	No. of Numeric Data	7 Numeric Data	○
	Displayed Waveforms	ECG1, BP1/2 (overlap),, SpO_2, CO_2	○
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO_2, TEMP/ RR, CO_2	○
	Enlarged Display	OFF	○
	Short Trend	OFF	○
	Comment	CONFIG. 5	○

Alarm Mode Setup

Item		***Default***	***Backup***
Alarm Mode		1	○
Alarm Mode 1～5	HR	ON 40－120	○
	AYSTOLE	ON 5 sec.	○
	VF	ON	○
	VT	ON	○
	SLOW_VT	ON	○
	RUN	ON 3 beats	○
	COUPLET	OFF	○
	PAUSE	OFF 2 sec.	○
	BIGEMINY	OFF	○
	TRIGEMINY	OFF	○
	FREQUENT	OFF 10 beats	○
	TACHY	ON	○
	BRADY	ON	○
	ST	OFF	○
	BP1 (mmHg)	ON SYS 80－180 DIA OFF－OFF MEAN OFF－OFF	○
	BP1 (kPa)	ON SYS 10.0－24.0 DIA OFF－OFF MEAN OFF－OFF	○
	BP2 (mmHg)	OFF SYS OFF－OFF DIA OFF－OFF MEAN OFF－OFF	○
	BP2 (kPa)	OFF SYS OFF－OFF DIA OFF－OFF MEAN OFF－OFF	○
	APNEA	ON 15 sec.	○
	SpO_2	ON 90－OFF	○
	NIBP (mmHg)	ON SYS 80－180 DIA OFF－OFF MEAN OFF－OFF	○
	NIBP (%)	ON SYS 10.0－24.0 DIA OFF－OFF MEAN OFF－OFF	○
	$EtCO_2$ (mmHg)	ON 30 - 45	○
	$EtCO_2$ (kPa)	ON 4.0 - 6.0	○
	$EtCO_2$ (%)	ON 4.0 - 6.0	○
	$InspCO_2$ (mmHg)	ON 3	○
	$InspCO_2$ (kPa)	ON 0.4	○
	$InspCO_2$ (%)	ON 0.4	○

This section explains the connector pin assignments.

Serial Connector Output Signal

No.	*Signal Type*	*Description*	*Signal Level*
1	RESET	Port Reset	TTL Hi Level Reset
2	RSV	Reserved	——
3	TxD	Serial Transmit Data Output	RS232C
4	SG	Signal GND	
5	RxD	Serial Receive Data Input	RS232C
6	+5V	+5V	＋5V power supply (150mA)
7	RSV	Reserved	——
8	NC	No Connection	——

Status I/O Signal

No.	*Signal Type*	*Description*	*Signal Level*
1	QRS SYNC	QRS SYNC Output	Logic TTL
2	ALM_OUT+	Alarm Output ＋ (Isolation)	Photo MOS Relay Contact
3	RSV	Reserved	——
4	RSV	Reserved	——
5	RSV	Reserved	——
6	RSV	Reserved	——
7	＋5V	+5V	＋5V power supply (150mA)
8	ALM_OUT-	Alarm Output － (Isolation)	Photo MOS Relay Contact
9	GND	Power Supply Digital GND	——

※ As the serial connector and status I/O connector uses the same isolation power supply, the total power supply capacity for ＋5V should be up to 200mA.

Chapter 12

Accessories

— Accessories — ····· 2
— Optional Accessories — ····· 3
ECG, Impedance Respiration Measurement ····· 3
Invasive Blood Pressure Measurement ····· 3
Non-Invasive Blood Pressure Measurement ····· 3
Temperature Measurement ····· 4
SpO_2 Measurement ····· 4
CO_2 Concentration Measurement ····· 4
Others ····· 4

— Accessories —

This section lists the accessories for the DS-7100 system.

⚠CAUTION	✍ 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.

Power Cable : CS-34 (3m)

ECG Lead Cable (5-lead) : #3380.0661.13

ECG Relay Cable (5-lead) : CI-700D-5

2ch BP Conversion Cable : CJ-7546

NIBP Air Hose : OA-7109B (3.5m)

Adult Cuff (Medium) : CUF-7102A

SpO_2 Interface Cable : DOC-10

Recording Paper : OP-124TE

This Operation Manual

— Optional Accessories —

The following products are available as optional accessories for the DS-7100 system. Purchase them as required.

⚠CAUTION	✍ 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.

ECG, Impedance Respiration Measurement

Item	*Model Type*	*Q'ty*	*Note*
ECG Lead Cable	3380.0648.13	1	3-electrode (hook type)
ECG Lead Cable	3380.0661.13	1	5-electrode (hook type)
ECG Lead Cable	500308800	1	4-electrode (hook type)
ECG Relay Cable	CI-700D-3	1	3-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-3	1	3-electrode (electrosurgery-proof) ※
ECG Relay Cable	CI-700D-4	1	4-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-4	1	4-electrode (electrosurgery-proof) ※
ECG Relay Cable	CI-700D-5	1	5-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-5	1	5-electrode (electrosurgery-proof) ※

⚠CAUTION	※ When using the electrosurgery-proof type ECG relay cable, respiration measurement can not be performed.

Invasive Blood Pressure Measurement

Item	*Model Type*	*Q'ty*	*Note*
Interface Cable (for Gambro)	CJ-369	1	
Interface Cable (for Becton Dichinson)	CJ-410	1	
2ch BP Conversion Cable	CJ-7546	1	

Non-Invasive Blood Pressure Measurement

Item	*Model Type*	*Q'ty*	*Note*
Adult Cuff (Large)	CUF-7101	1	
Adult Cuff (Medium)	CUF-7102A	1	
Adult Cuff (Small)	CUF-7103	1	
Pediatric Cuff	CUF-7104	1	
Infant Cuff	CUF-7105	1	
NIBP Air Hose (1.5m)	OA-7109A	1	
NIBP Air Hose (3.5m)	OA-7109B	1	
NIBP Extension Hose (1.5m)	OA-7110A	1	
NIBP Extension Hose (3.5m)	OA-7110B	1	
BP Conversion Socket	CUFJ-MO1	1	for connection to neonate cuff

Temperature Measurement

Item	*Model Type*	*Q'ty*	*Note*
Rectal Temperature Probe (for adult)	401J	1	
Rectal Temperature Probe (for pediatric)	402J	1	
Body Surface Temperature Probe	409J	1	
Probe Cover	70 14 616	10	

SpO_2 Measurement

Item	*Model Type*	*Q'ty*	*Note*
SpO_2 DURASENSOR®	DS-100A	1	
SpO_2 OXISENSOR® III	D-25	1	24 per box
SpO_2 OXISENSOR® III	D-20	1	24 per box
SpO_2 OXISENSOR® III	I-20	1	24 per box
SpO_2 OXISENSOR® III	N-25	1	24 per box
SpO_2 OXISENSOR® III	R-15	1	24 per box
SpO_2 Relay Cable	DOC-10	1	
MAX-FAST	MAX-FAST	1	24 per box

CO_2 Concentration Measurement

Item	*Model Type*	*Q'ty*	*Note*
FilterLine H Set (Adult / Pediatric)	XS04624	1	with Nafion, adapter (25 per box)
FilterLine H Set (Infant / Neonate)	006324	1	with Nafion, adapter (25 per box)
Capno Line H (Adult)	008177	1	for nasal, with Nafion (25 per box)
Capno Line H (Pediatric)	008178	1	for nasal, with Nafion (25 per box)
CapnoLine H (Baby / Neonate)	008179	1	for nasal, with Nafion (25 per box)
CapnoLine H / O_2 (Adult)	008180	1	for nasal, with Nafion, oxygen delivery (25 per box)
CapnoLine H / O_2 (Pediatric)	008181	1	for nasal, with Nafion, oxygen delivery (25 per box)
Calibration Gas Kit (5% CO_2)	GR08081	1	

Others

Item	*Model Type*	*Q'ty*	*Note*
Ground Cable	CE-12	1	
Battery Pack	T4UR18650F-2-4644	1	
DS-7100 Mount Kit	OA-451	1	
Recording Paper	OP-124TE	1	
Cleaning Cloth	OA-57	1	