CMS8000

PATIENT MONITOR

SERVICE MANUAL

CONTEC MEDICAL SYSTEMS Co., LTD

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HOW TO CONTACT US

Address:#2-1 Hengshan Road, Qinhuangdao Economic & Technical Development Zone, Hebei Province, PRC

Tel: +86-335-8015433

Fax: +86-335-8015432

E-mail: cms@contecmed.com.cn

Website: http://www.contecmed.com.cn

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Table of Contents

Chapter 1 Introduction And Intended Use

1.1 Introduction

The CMS8000 Patient Monitor can monitor vital signals as ECG, Respiratory Rate, SpO_2, NIBP, and Dual-TEMP, (Dual-IBP and CO_2. are optional) It integrates parameter measuring modules, display and recorder in one device, featuring in compactness, lightweight and portability. Replaceable built-in battery facilitates transportation of patient. Large high-resolution display provides clear view of 7 waveforms and full monitoring parameters.

1.2 Indications For Use

The CMS8000 Patient Monitor has abundant monitoring functions and is used for the clinical monitoring of adult, pediatric and neonatal patients. In addition, the user may select the different parameter configuration according to different requirements.
The monitor can be connected to the central monitoring system via our network so as to form a network monitoring system.

1.3 Contraindications

Reusable SpO_2 sensor is contraindicated for use for prolonged periods of use. It is not intended for long term monitoring. It must be removed and repositioned every four hours and if indicated by circulatory condition or skin integrity, reapplied to a different monitoring site. Disposable SpO_2 sensors are contraindicated for patients that exhibit allergic reactions to adhesive tape. The sensors must be removed and repositioned every eight hours and if indicated by circulatory condition or skin integrity, reapplied to a different monitoring site.
Check everyday whether there is skin irritation resulted from the ECG electrodes. If so, replace electrodes every 24 hours or change their sites.
You must not perform NIBP measurements on patients with sickle-cell disease or under any condition which the skin is damaged or expected to be damaged.
Oral and Rectal Temperature measurements are not intended for neonatal use.
No other contraindications are known at this time.

1.4 Function

The Monitor performs monitoring of:

▲ECG

Heart Rate (HR), 2-channel ECG waveforms, Arrhythmia and S-T segment analysis （optional）

▲SpO_2

Oxygen Saturation (SpO_2), Pulse Rate (PR), SpO_2 Plethysmogram

▲NIBP

Systolic Pressure (NS), Diastolic Pressure (ND), Mean Pressure (NM)

▲RESP

Respiratory Rate (RR), Respiration Waveform

▲TEMP

Channel-1 Temperature (T1) , Channel-2 Temperature (T2), Temperature Difference between two channels (TD)

▲IBP (Optional)

Channel-1 SYS, DIA, MAP; Channel-2 SYS, DIA, MAP; Dual-IBP waveforms

▲CO_2 (Optional)

End Tidal CO_2 $EtCO_2$; Inspried Minimum CO_2($InsCO_2$); Air Way Respriation Rate(AwRR)

1.5 Patient Environment

The CMS8000 Patient Monitor has been tested with specific parts of the "system" used within the Patient Environment. Figure 1-1, defines the Patient Environment.

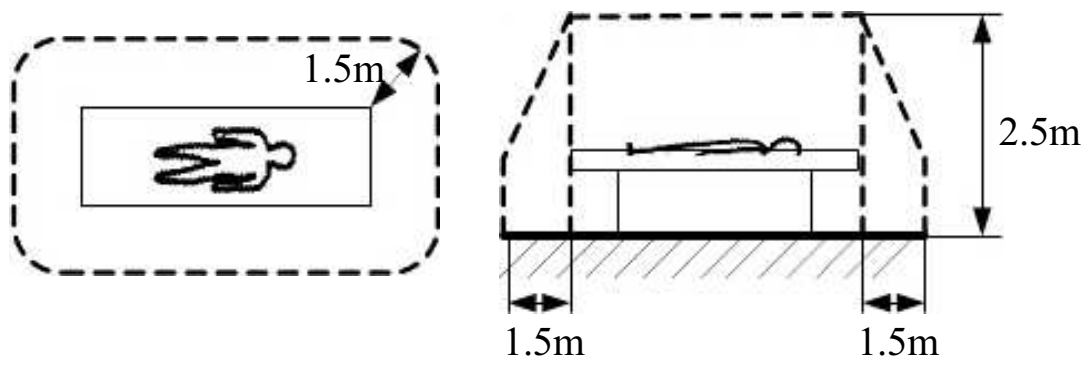


Figure 1-1 Patient Environment

1.6 Manual Overview

This manual contains information for diagnosing and servicing the The CMS8000 Patient Monitor to board level without the necessity of electrical schematics. Only qualified service personnel should service this product.

Only qualified service personnel should service this product. It is responsibility of the user to ensure that the product is properly maintained and that the monitor is in safe and proper operating condition before being put into use.

Before servicing the he CMS8000 Patient Monitor , read the User's Manual carefully.

CONTEC MEDICAL SYSTEMS CO.,LTD. believes the information herein is complete and accurate, but accepts no liability for errors, omissions, or misrepresentations.

1.7 Conventions

In this manual, "WARNING", "CAUTION", and "NOTE" mean the following:

WARNING:

Directions that warn of conditions that put the patient, or caregiver, at risk.

CAUTION:

Directions that help you avoid damaging your monitor or losing data.

NOTE:

Directions that make it easier to use your monitor.

1.8 Related Documents

To perform test and troubleshooting procedures, you must know how to operate the monitor. Refer to the CMS8000 Patient Monitor User's Manual.

Chapter 2 Service Policy

CONTEC MEDICAL SYSTEMS CO.,LTD.Warrants the monitor, when new, to be free from defects in material and workmanship and to perform in accordance with manufacturer 's specifications for a period of one year from the date of original purchase from CMS or its authorized distributors or agents .

Our obligation under this warranty is limited to repairing or, at our option, replacing any defective parts or our equipment, without charge, if such defects occur in normal service and with prompt notification.

Damage to any part through misuse, neglect, or accident, or by affixing any accessories or attachments other than CMS manufactured or approved accessories or attachments in User's Manual., is not covered by this warranty.

In the event that it becomes necessary to return a unit to our company, the following procedure should be followed:

1）Obtain return authorization.

Contact our Service Department and obtain a Customer Service Authorization number. The number must appear on the outside of the shipping containterior. Return shipments will not be accepted if the number is not clearly visible. Please provide the model number, serial number, and a brief description of the reason for return.

2）Freight policy.

The customer is responsible for freight charges when equipment is shipped to our company for service (this includes customs charges).

Chapter 3 Safety Measures And Warnings

WARNING:

▲ DO NOT use this instrument for any purpose other than specified in this manual. Doing so will invalidate the monitor's warranty.。

▲ DO NOT connect more than one patient to the monitor.

▲ The Monitor is intended for clinical monitoring application with operation only granted to appropriate medical staff.

▲ There could be hazard of electrical shock by opening the monitor casing. All servicing and future upgrading to this equipment must be carried out by personnel trained and authorized by our company.

▲ Possible explosion hazard if used in the presence of flammable anesthetics or other flammable substance in combination with air, oxygen-enriched environments, or nitrous oxide.

▲ You must verify if the device and accessories can function safely and normally before use.

▲ Do not use cellular phone in the vicinity of this device. High level electromagnetic radiation emitted from such devices may greatly affect the monitor performance.

▲ Do not touch the patient, table, or the device during defibrillation.

▲ When used with Electro-surgery equipment, you (doctor or nurse) must give top priority to the patient safety.

▲ If any sign of damage is detected, or the monitor displays some error messages, do not use it on any patient. Contact biomedical engineer in the hospital or our Customer Service Center immediately.

▲ If the protective grounding (protective earth) system is doubtful, the monitor must be supplied by inner power only.

▲ Before cleaning the monitor or the sensor, make sure that the equipment is switched off and disconnected from the power line.

▲ When the monitor is used with HF surgical equipment, the transducer and the cables must be avoided conductive connection to the HF equipment to protect against burns to the patient.

▲ The disposable transducers or domes must not be re-sterilized or re-used.

▲ CO_2 module shall be avoided from crash and vibration.

CAUTION:

▲ If you have any doubt to the grounding layout and its performance, you must use the built-in battery to power the monitor.

▲ Follow the manufacturer's instruction to dilute the solution, or adopt the lowest possible density. Do not let liquid enter the monitor. No part of this monitor can be subjected to immersion in liquid. Do not pour liquid onto the monitor during sterilization. Use a moistened cloth to wipe up any agent remained on the monitor.

▲ Do not use EtO gas or formaldehyde to disinfect the monitor.

▲ Use only CMS(CONTEC MEDICAL SYSTEMS) approved accessories and sensors to preserve the integrity, accuracy and the electromagnetic compatibility of the monitor.

▲ DO NOT use the monitor during an MRI scan. The monitor may affect the MRI image, and the MRI unit may affect the accuracy of blood pressure measurements.

▲ The monitor does not operate effectively if a patient is having seizure activity or is connected to a heart/lung machine.

NOTES:

▲ If the power supply is not properly connected before turning on the monitor, it may not work properly because of insufficient power. Connect the power supply to charge the battery.

▲ Check all the functions that may be used to monitor and make sure that the monitor is in good status.

▲ The battery must be recharged to the full electricity after each use to ensure adequate electricity reserve.

▲ The interval between twice press of POWER should be more than 1 minute.

▲ When alarms of different levels occur at the same time, the monitor prompts the one of the highest level.

▲ the monitor and sensor surface can be cleaned with hospital-grade ethanol and dried in air or with crisp and clean cloth.

▲ For protecting environment, the electrodes must be recycled or disposed of properly.

▲ If the accuracy of any measurement does not seem reasonable, first check the patient 's vital signs by alternate means and then check the CMS8000 Monitor for proper functioning.

▲ Working system:Continuous running equipment.

▲ Anti-electroshock type:Class I equipment and internal powered equipment.

▲ EMC type:Class A.

▲ Anti-electroshock degree: ECG(RESP), SpO_2, NIBP, IBP,TEMP,CO_2---CF.

▲ Harmful liquid proof degree:Ordinary equipment. (sealed equipment without liquid proof)

▲ Power Supply:100~240VAC, 50/60 Hz, Pmax=50VA.

Chapter 4 Environment

Please refer to the CMS8000 User Manual(Operation Manual)

Chapter 5 Symbols

 : Flag for alarm PAUSE.

 : Flag for alarm SILENCE.

 : Flag for Alarm Volume Off.

 : This symbol means “BE CAREFUL". Refer to the manual.

 : Indicates that the instrument is IEC 60601-1 Type CF equipment.

 : Indicate the status of recharging.

 : Equipotential grounding system.

 : Protective earth ground.

 : Partial On/Off.

Chapter 6 Outlook And Configuration

6.1 Screen Display

The display of the monitor is a color LCD, which can display the collected patient parameters, waveforms, alarm information as well as bed number, time and monitor status, etc.

The screen is divided into three areas(Figure 6-1): Information area ①④; waveform area②; parameter area③.

Figure 6-1 Main Display

Information Area

The Message Area is at the top part of the screen, displaying the current status of both the monitor and the patient.

- Patient information include:

BED NO	Bed numbers of all patients under monitoring
Patient type	Three options: Adult, Pediatric, Neonate
"01-01-2005"	Current date
"07：11：17"	Current date and time
M	Patient sex, Male or Female
BLOOD	Patient blood type

Other information in the Message Area will appear and disappear together with the reported status. According to the content, the information is divided into:

■ Prompt information, reporting the current status of the monitor or sensor/probe, which always appears to the right of the system time. When this information appears, it will cover patient sex and name.

■  flag for alarm PAUSE. Press "SILENCE" button once (less than 1 second) to mute all alarm sounds and the flag appears at the same time.. Press the button again to terminate the PAUSE status. The duration for PAUSE status can be 1 minute, 2 minutes or 3 minutes.

■  flag for alarm SILENCE. Press "SILENCE" button once (more than 1 second) to manually mute the alarm sound and this flag appears at the same time. The SILENCE status terminates when you discharge the status or new alarm occurs.

■  flag for Alarm Volume Off. It appears indicating that you have closed the alarm sound permanently. This status terminates when you discharges the status.

⚠ Note ⚠

If  symbol appears, the system will no longer give audible alarm sound. You must be very careful in using this function. Two ways can be used to discharge this status. One is set the alarm volume to an option other than OFF in the USER MAINTAIN menu. The other method is to press SILENCE button to make the flag turn to  . And then press SILENCE again and the system will restore the normal alarm status.

■ Parameter alarm information is displayed always in the upper right corner of the screen.

■ When the waveforms on the screen are frozen, the FREEZE prompt will appear in the bottom part of the screen.

Waveform / Menu Area

The waveform area can maximally display 7 waveforms. The displaying order of the waveforms on the screen can be adjusted. For the maximum configuration, the waveforms provided by the system for selection are: 2 ECG waveforms, SpO2 waveform, 2IBP waveforms,RESP waveform,CO2 waveform.

All the waveforms in the system are listed out in the "WAVE SETUP" menu. The user may adjust their displaying positions. The specific method is illustrated in the part: WAVE SETUP/ WAVE SWITCH.

The name of the waveform is displayed on the upper left part of the waveform. The user may choose ECG lead based on the requirements. The gain of the channel and the filter way are also displayed on each ECG waveform. A 1mV scale bar is also displayed to one side of ECG waveform. The IBP waveform scale can also be selected according to the actual requirement. In the IBP waveform area, the waveform scale is displayed. The three dotted lines for each IBP waveform form up to down represent respectively the upper limit scale, reference scale and lower limit scale. The values of these three scales can be set.

When menu is wanted during screen operation, the menu always occupies the fixed position in the middle part of the waveform area, therefore part of waveform can not be viewed temporarily. After exiting the menu, the system will restores the original screen.

The user may set up the rate to refresh the waveform. The method to adjust the refreshing rate of each waveform is discussed in the setup description of each parameter.

Parameter Area

The parameter area lies to the right side of the waveform area, whose position basically corresponds to the waveform. The parameters displayed in the parameter area include:

ECG

- heart rate or pulse rate (unit: beats/minute)
- The ST analyzing result of channel 1 and 2: ST1, ST2 (unit: mV)
- PVCs（unit: times/minute）

NIBP

— From left to right, there are Systolic pressure, Mean pressure and Diastolic pressure（unit: mmHg or kPa）

SpO_2

— SpO_2（unit: %）

— Pulse Rate（unit: beats/minute）（ When "BOTH" item is selected ）

IBP

－The blood pressure of channel 1 and 2. From left to right, there are Systolic pressure, Mean pressure and Diastolic Pressure(unit:mmHg or kPa).

CO_2

－$EtCO_2$(unit:mmHg or kPa)

－INS CO_2 (unit: mmHg or kPa)

－AwRR(times/minute)

RESP

— Respiration Rate（unit: times/minute）

TEMP

— Temperature of channel 1 and 2: T1, T2 and the difference between them TD. (unit: ℃ or ℉）

Alarm lamp and alarm status:

In normal status: the alarm lamp is not on.

When alarm exists, the alarm lamp flashes or lights on. The color of the lamp corresponds to the alarm level.

⚠Warning⚠

Always verify the self-check function of audible and visual (LED) alarms when powers on.

6.2 Front Panel View

Figure 6-2 Front Panel View

All the operations to the monitor are through the buttons and a knob at the bottom of the screen.

The names of the buttons are above them. They are:

- MAIN

Whatever levels of menu the system is in, press the button and the system will always return to the main screen.

- FREEZE

Press this button and the system will access the FREEZE status. In this status the user may review the waveform of 34 seconds. Also, the frozen waveform can be printed out. In the FREEZE status, press this button again to discharge the FREEZE status.

- SILENCE

Push this button to suspend alarm for maximum 3 minutes (with 1 minute, 2 minutes and 3 minutes selectable). In Alarm PAUSE status, a symbol appears in the Message Area. Push this button for more than 1 second to mute all kinds of sounds (including alarm sound, heart beat, pulse tone, key sound). At the same time, a symbol appears in the Message Area. Push this button again to restore all kinds of sounds and the symbol appears from the screen.

- START

Press to inflate the cuff to start a blood pressure measurement. When measuring, press to cancel the measurement and deflate the cuff.

- REC/STOP

Press to start a real time recording. The recording time is set in REC TIME of RECORD SETUP submenu. Press during recording to stop the recording.

- MENU

Press this button to call up the MAIN MENU, in which the user may set up system information and perform review operation.

- Rotary knob

The user may use the rotary knob to select the menu item and modify the setup. It can be rotated clockwise or counter-clockwise and pressed like other buttons. The user may use the knob to realize the operations on the screen and in the system menu and parameter menu.

6.3 Rear Panel View

Figure 6-3 Rear Panel View

On the rear panel are the following sockets, shown in Figure 6-3.

■ Power Supply: 100V~240V (VAC), 50/60 (Hz). (Socket ③)

■ ⏚ (Socket ②)

Equipotential grounding terminal for connection with the hospital 's grounding system.

■ Network Interfaces (Socket ①): Standard RJ45 Socket.

Fuse(Socket④⑤): T1.6A

6.4 Left Panel View

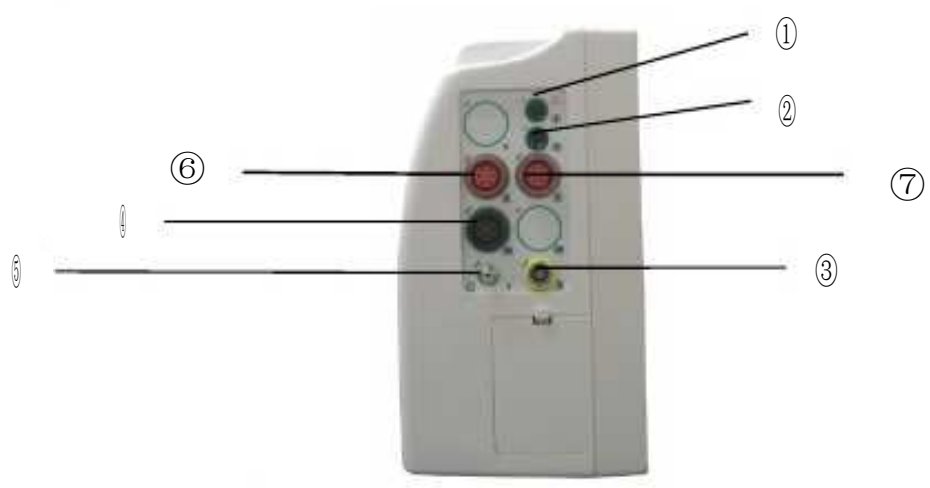


Figure 6-4 Left Panel View

At the left side are the connectors to patient cables and the sensors, as shown in Figure 6-4.

① Socket for channel 1 TEMP probe
② Socket for channel 2 TEMP probe
③ Socket for Spo2 Sensor
④ Socket for ECG cable
⑤ Socket for NIBP cuff
⑥ Socket for IBP1 cable
⑦ Socket for IBP2 cable

6.5 Right Panel View

At the right side is the recorder(Figure 6 -5①)

Figure 6- 5 Right Panel View

Chapter7 Troubleshooting

7.1 System Module

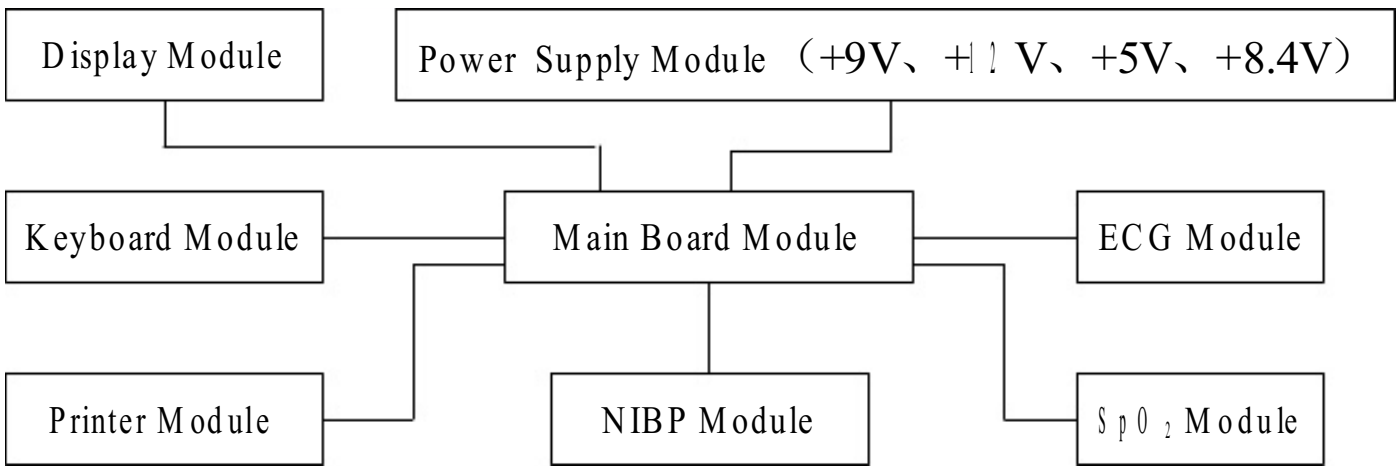


Figure 7-1 Overall Block Diagram

7.2 Error Message

The Monitor displays a variety of messages to aid the user in monitor operation. If a troubleshooting message is displayed during a measurement, follow the actions listed to correct the situation.

If the monitor does not turn on, or exhibits a flashing display and failure to operate, the battery is most likely below the Dead Battery point. Connect the monitor to a power source and allow it to charge for at least four hours.

If the monitor is in need of repair, it must be referred to the appropriate service personnel. Service performed by unauthorized personnel could be detrimental to the monitor and will void the warranty. For service, contact your dealer or CONTEC MEDICAL SYSTEMS CO.,LTD.

System alarm message is as follows:

Table 7-1 System Alarm Prompt

PROMPT	CAUSE	MEASURE
"XX TOO HIGH"	XX value exceeds the higher alarm limit.	Check if the alarm limits are appropriate and the current situation of the patient.
"XX TOO LOW"	XX value is below the lower alarm limit.	
XX represents the value of parameter such as HR, ST1, ST2, RR, SpO_2, IBP, NIBP, etc in the system.		
"ECG WEAK SIGNAL"	The ECG signal of the patient is too small so that the system can not perform ECG analysis.	Check if the electrodes and lead wires are connected correctly and the current situation of the patient.
“NO PULSE”	The pulse signal of the patient is too small so that the system can not perform pulse analysis.	Check the connection of the sensor and the current situation of the patient.
"RESP APNEA"	The respiration signal of the patient is too small so that the sy	Check the connection of the linking wire and the current situati

	stem cannot perform RESP analysis.	on of the patient.
"CO_2 APNEA"	The respiration signal of the patient is too small so that the system cannot perform RESP analysis.	Check the connection of CO_2 sensor and the current situation of the patient.
"ASYSTOLE"	Patient suffers from Arr. Of ASYSTOLE.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"VFIB/VTAC"	Patient suffers from Arr. of VFIB/VTAC.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"COUPLET"	Patient suffers from Arr. of COUPLET.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"BIGEMINY"	Patient suffers from Arr. Of BIGEMINY.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"TRIGEMINY"	Patient suffers from Arr. of TRIGEMINY.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"R ON T"	Patient suffers from Arr. of R ON T.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"PVC"	Patient suffers from Arr. of PVC.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"TACHY"	Patient suffers from TACHY.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
" BRADY"	Patient suffers from BRADY.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"VT>2"	Patient suffers from Arr. of VT>2.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
“MISSED BEATS”	Patient suffers from Arr. of MISSED BEATS.	Check the current situation of the patient. Check the connection of the electrodes and lead wires.
"PNP"	The pacemaker is not paced.	Check the connection of the

		pacemaker. Check the connection of electrodes and lead wires. Check the current situation of the patient.
"PNC"	No pacemaker signal is captured.	Check the connection of the pacemaker. Check the connection of electrodes and lead wires. Check the current situation of the patient.
"ECG LEAD OFF"	ECG lead is not connected correctly.	Check the connection of ECG lead wire.
"ECG V LEAD OFF";	The V lead wire of ECG is not connected correctly.	Check the connection of V lead wire.
"ECG LL LEAD OFF";	The LL lead wire of ECG is not connected correctly.	Check the connection of LL lead wire.
"ECG LA LEAD OFF";	The LA lead wire of ECG is not connected correctly.	Check the connection of LA lead wire.
"ECG RA LEAD OFF";	The RA lead wire of ECG is not connected correctly.	Check the connection of RA lead wire.
"ECG C LEAD OFF";	The C lead wire of ECG is not connected correctly.	Check the connection of C lead wire.
"ECG F LEAD OFF";	The F lead wire of ECG is not connected correctly.	Check the connection of F lead wire.
"ECG L LEAD OFF";	The L lead wire of ECG is not connected correctly.	Check the connection of L lead wire.
"ECG R LEAD OFF";	The R lead wire of ECG is not connected correctly.	Check the connection of R lead wire.
SPO_2 SENSOR OFF	SpO_2 sensor may be disconnected from the patient or the monitor.	Make sure that the monitor and the patient are in correct connection with the cables.
SPO_2 INIT ERR	SpO_2 module failure	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SPO_2 INIT ERR 1		
SPO_2 INIT ERR 2		
SPO_2 INIT ERR 3		
SPO_2 INIT ERR 4		
SPO_2 INIT ERR 5		

SPO_2 INIT ERR 6		
SPO_2 INIT ERR 7		
SPO_2 INIT ERR 8		
SPO_2 COMM STOP	SpO_2 module failure or communication error	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SPO_2 COMM ERR	SpO_2 module failure or communication error	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SPO_2 ALM LMT ERR	Functional safety failure	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
PR ALM LMT ERR	Functional safety failure	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
Alarm information:		
SpO_2 NO SENSOR	Sensor not fully inserted into the connector.	May be an incorrect sensor, or a defective sensor or cable. Insert sensor into the connector. Disconnect and reconnect sensor. Refer to the instructions for the sensor being used.
	Sensor inserted upside down.	Disconnect and reconnect he sensor with the logos matching.
SpO_2 SENSOR OFF	SpO_2 sensor may be disconnected from the patient or the monitor.	Disconnect and reconnect the sensor. Reattach sensor.
SpO_2 SENSOR FAULT	This message appears when the sensor is faulty	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SpO_2 UNRECOGNIZED SENSOR	board does not recognize the sensor.	Make sure that the monitor and the patient are in correct connection with the cables.
SpO_2 INCOMPATIBLE SENSOR	This message is displayed when the sensor is finding incompatible sensor.	Make sure that the monitor use incompatible sensor.
SpO_2 INTERFERENCE	Outside signal or energy preventing reading.	Remove outside interference.
SpO_2 PULSE SEARCH	Unit is searching for the patients pulse.	If values are not displayed within 30 seconds, disconnect and reconnect sensor. If pulse search continues, remove sensor and repla

		ce on a better perfused site.
SpO_2 LOW PERFUSTION	Signal too small.	Move sensor to better perfused site.
SpO_2 TOO MUCH LIGHT	Too much light on patient(sensor). Inadequate tissue covering sensor detector.	Remove or reduce lighting. Cover sensor from light. Reposition sensor.
SpO_2 LOW SIGNAL IQ	Low signal quality.	Ensure proper sensor application. Mover sensor to a better perfused site.
SpO_2 BOARD FAULT	This message appears when the Set board malfunctions.	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SpO_2 COMMUNICATION ERROR	This message is displayed when the front end module is having problems communicating (ie: framing errors or bad checksums) with the board.	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SpO_2 COMMUNICATION STOP	This message is displayed when the host can not receive the data from board for 5 seconds	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
SpO_2 INIT ERR	This message is displayed when the SpO_2 module initialization error happened.	Stop using the measuring function of SpO_2 module, notify biomedical engineer or our service staff.
"TEMP1 SENSOR OFF"	TEMP1 sensor is not connected correctly.	Check the connection of TEMP1 sensor.
"TEMP2 SENSOR OFF"	TEMP2 sensor is not connected correctly.	Check the connection of TEMP2 sensor.
"TEMP1 SENSOR OFF"	TEMP1 sensor is not connected correctly.	Check the connection of TEMP1 sensor.
"TEMP2 SENSOR OFF"	TEMP2 sensor is not connected correctly.	Check the connection of TEMP2 sensor.
"IBP1 LEAD OFF"	IBP1 sensor is not connected correctly.	Check the connection of IBP1 sensor.
"IBP2 LEAD OFF"	IBP2 sensor is not connected correctly.	Check the connection of IBP2 sensor.

"IBP1 NEED ZERO-CAL"	Zero calibrating must be done before measuring in IBP1	Do zero calibrating for IBP1
"IBP2 NEED ZERO-CAL"	Zero calibrating must be done before measuring in IBP2	Do zero calibrating for IBP2
"TB SENSOR OFF"	TB sensor is not connected correctly.	Check the connection of TB sensor.
"ECG NOISE"	Rather large interference signals appear in the ECG signals.	Check the connection of ECG lead wire. Check the current situation of the patient. Check if the patient moves a lot.
"XX INIT ERR X"	XX has error X during initialization.	Re-start up the monitor or re-plug in/out the module. If the error still exists, contact the manufacturer.
"XX COMM STOP"	XX cannot communicate with the host.	
"XX COMM ERR"	XX cannot communicate normally with the host.	
XX represents all the parameter modules in the system such as ECG, NIBP, SpO_2, IBPmodule, etc.		
"XX ALM LMT ERR"	The alarm limit of XX parameter is modified by chance.	Contact the manufacturer for repair.
"XX RANGE EXCEEDED"	The measured value of XX parameter has exceeded the measuring range of the system.	Contact the manufacturer for repair.
XX represents the parameter name in the system such as HR, ST1, ST2, RR, SpO_2, IBP, NIBP, etc.		
"CO_2 Sensor Faulty"	The Sensor Source Current Failure	Check that the sensor is properly plugged in. Reinsert or reseat the sensor if necessary. If error persists,return sensor to factory for servicing.
"CO_2 Sensor Over temp"	The sensor temperature is greater than 40℃	Make sure sensor is not exposed to extreme heat. If error persists, return sensor to factory for servicing.
"CO_2 Check Sampling Line"	This error occurs whenever the pneumatic pressure is outside the expected rang	Check that the sampling line is not occluded or kinked.

"CO_2 Zero Error"	An error was found during Zero	To clear, check airway adapter and clean if necessary. If this does not correct the error, perform an adapter zero.
"CO_2 Out of Range"	The value being calculated is greater than the upper CO_2 limit.	If error persists, perform a zero.
"CO_2 Check Airway Adapter"	Usually caused when the airway adapter is removed from the sensor or when there is an optical blockage on the windows of the airway adapter. May also be caused by failure to perform Zero to When adapter type is changed.	To clear, clean airway adapter if mucus or moisture is seen. If the adapter is clean, perform a Zero.
"CO_2 not initialized"	Barometric Pressure or gas compensatins have not been set since power on.	Set the Barometric Pressure and gas compensations to clear this error.
"REAL CLOCK NEEDSET"	When the system displays 2000-1-1, the system gives this prompt reminding the user that the current system time is not right.	Re-set up the system time. It is better to set up the time just after the start-up and prior to monitoring the patient. After modifying the time, the user had better re-start up the monitor to avoid storing error time.
"REAL CLOCK NOT EXIST"	The system has no cell battery or the battery has run out of the capacity.	Install or replace the rechargeable battery.
"SYSTEM WD FAILURE"	The system has serious error.	Re-start up the system. If the failure still exists, contact the manufacturer.
"SYSTEM SOFTWARE ERR"		
"SYSTEM CMOS FULL"		
"SYSTEM CMOS ERR"		
"SYSTEM EPGA FAILURE"		
"SYSTEM FAILURE2"		
"SYSTEM FAILURE3"		
"SYSTEM FAILURE4"		
"SYSTEM FAILURE5"		
"SYSTEM FAILURE6"		
"SYSTEM FAILURE7"		

"SYSTEM FAILURE8"		
"SYSTEM FAILURE9"		
"SYSTEM FAILURE10"		
"SYSTEM FAILURE11"		
"SYSTEM FAILURE12"		
"KEYBOARD NOT AVAILABLE";	The keys on the keyboard cannot be used.	Check the keys to see whether it is pressed manually or by other object. If the key is not pressed abnormally, contact the manufacturer for repair.
"KEYBOARD COMM ERR";	The keyboard has failure, which cannot be used.	Contact the manufacturer for repair.
"KEBOARD ERROR";		
"KEYBOARD ERR1";		
"KEYBOARD ERR2";		
"NET INIT ERR(G.)"	The network part in the system has failure. The system cannot be linked to the net.	Contact the manufacturer for repair.
"NET INIT ERR(Ram)"		
"NET INIT ERR(Reg)"		
"NET INIT ERR(Mii)"		
"NET INIT ERR(Loop)"		
"NET ERR(Run1)"		
"NET ERR(Run2)"		
"NET ERR(Run3)"		
"5V TOO HIGH"	The power part of the system has failure.	If the prompt appears repeatedly, contact the manufacturer for repair.
"5V TOO LOW"		
"POWER ERR3"		
"POWER ERR4"		
"12V TOO HIGH"		
"12V TOO LOW"		
"POWER ERR7"		
"POWER ERR8"		
"3.3V TOO HIGH"		
"3.3V TOO LOW"		
"CELL BAT TOO HIGH"	Cell battery has problem.	Replace the battery. If the failure still exists, contact the manufacturer.
"CELL BAT TOO LOW"	The cell battery has low capacity or the cell battery is not installed or the connection is loose.	

"RECORDER SELFTEST ERR"	During the selftest, the system fails connecting with the recorder module.	Execute 'Clear Record Task' function in the recorder setup menu to re-connect the host and the recorder. If the failure still exists, contact the manufacturer for repair.
"RECORDER VLT HIGH"	The recorder module has voltage failure.	Contact the manufacturer for repair.
"RECORDER VLT LOW"		
"RECORDER HEAD HOT"	The continuous recording time may be too long.	After the recorder becomes cool, use the recorder for output again. If the failure still exists, contact the manufacturer for repair.
"REC HEAD IN WRONG POSITION"	The handle for pressing the paper is not pressed down.	Press down the recorder handle for pressing the paper.
"RECORDER OUT OF PAPER"	No paper is in the recorder.	Place the paper into the recorder.
"RECORDER PAPER JAM"	The paper in the recorder is jammed.	Place the recorder correctly and try again.
"RECORDER COMM ERR"	The communication of the recorder is abnormal.	In the recorder setup menu, execute the function of clearing record task. The function can make the host and the recorder connect again. If the failure still exists, contact the manufacturer for repair.
"RECORDER S. COMM ERR"		
"RECORDER PAPER W.P."	The paper roll of the recorder is not placed in the correction position.	Place the paper roll in the correct position.
"REC NOT AVAILABLE"	Cannot communicate with the recorder.	In the recorder setup menu, execute the function of clearing record task. The function can make the host and the recorder connect again. If the failure still exists, contact the manufacturer for repair.
"NIBP INIT ERR"	NIBP initialization error	Execute the reset program in the NIBP menu. If the failure still exists, contact the manufacturer

"NIBP SELFTEST ERR"		for repair.
"NIBP ILLEGALLY RESET"	During NIBP measurement, illegal reset occurs.	Check the airway of NIBP to see if there are clogs. Then measure again, if the failure still exists, contact the manufacturer for repair.
"NIBP COMM ERR"	The NIBP communication part has problem.	Execute the reset program in the NIBP menu. If the failure still exists, contact the manufacturer for repair.
"LOOSE CUFF"	The NIBP cuff is not connected correctly.	Re-connect the NIBP cuff.
"AIR LEAK"	The NIBP cuff is not connected correctly or there are leaks in the airway.	Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair.
"AIR PRESSURE ERROR"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair.
"WEAK SIGNAL"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check if the setup of patient type is correct. Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair
"RANGE EXCEEDED"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair.
"EXCESSIVE MOTION"	The patient arm moves.	Check the connection of each part and the patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.

"OVER PRESSURE"	Perhaps folds exist in the airway.	Check for the smoothness in the airway and patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.
"SIGNAL SATURATED"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part and the patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.
"NIBP TIME OUT"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part and the patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.
"CUFF TYPE ERR"	Perhaps the used cuff does not fit the setup patient type.	Check if the patient type is set up correctly. Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair.
"PNEUMATIC LEAK"	NIBP airway has leaks.	Check the connection of each part or replace with a new cuff. If the failure still exists, contact the manufacturer for repair.
"MEASURE FAIL"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part and the patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.
"NIBP SYSTEM FAILURE"	Problem happens when measuring the curve. The system cannot perform measurement, analysis or calculation.	Check the connection of each part and the patient situation. Measure again, if the failure still exists, contact the manufacturer for repair.

7.3 PCB Interface

7.3.1 Main Board

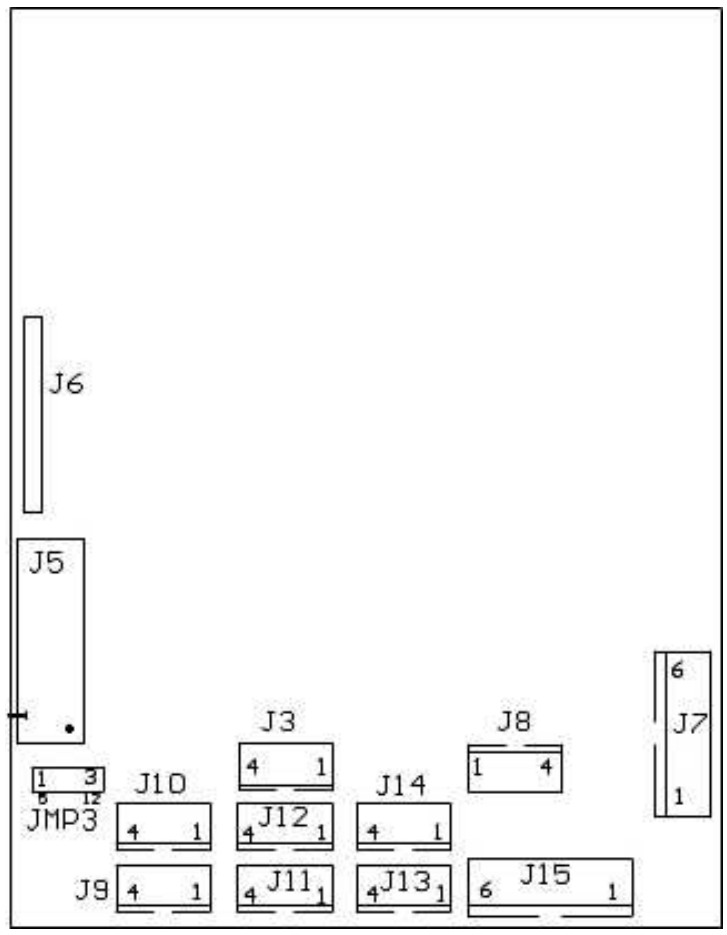


Figure 7-2 Main Board Interface

Table 7-2 Main Board Interface Introduce

Connector	Function	Definition
J5	Connect LCD line	30 PIN Interval: 0.5mm
J7	Connect Main Power Supply module JP4	6 PIN Interval: 2.54mm PIN 1~6: +5V,GND,+8.4V,+8.4V,GND,+5V
J8	Network Interface	4 PIN Interval: 2.00mm
J9	Connect CO_2 link module J1	4 PIN Interval: 2.00mm PIN 1~4: +5V, GND,TXD,RXD
J11	Connect SpO_2 module J1	4 PIN Interval: 2.00mm PIN 1~4: +5V, GND,TXD,RXD
J13	Connect Printer module J2	4 PIN Interval: 2.00mm PIN 1~4: +8.4V, GND,TXD,RXD
J14	Connect Main Power supply module JP3	4 PIN Interval: 2.00mm PIN 1~4: +5V, GND,TXD,RXD
J15	Connect Integrative module JHOST	6 PIN Interval: 2.00mm PIN 1~6: +5V,NIBP-EN, +8.4V, GND, TXD, RXD

7.3.2 SpO_2 Module

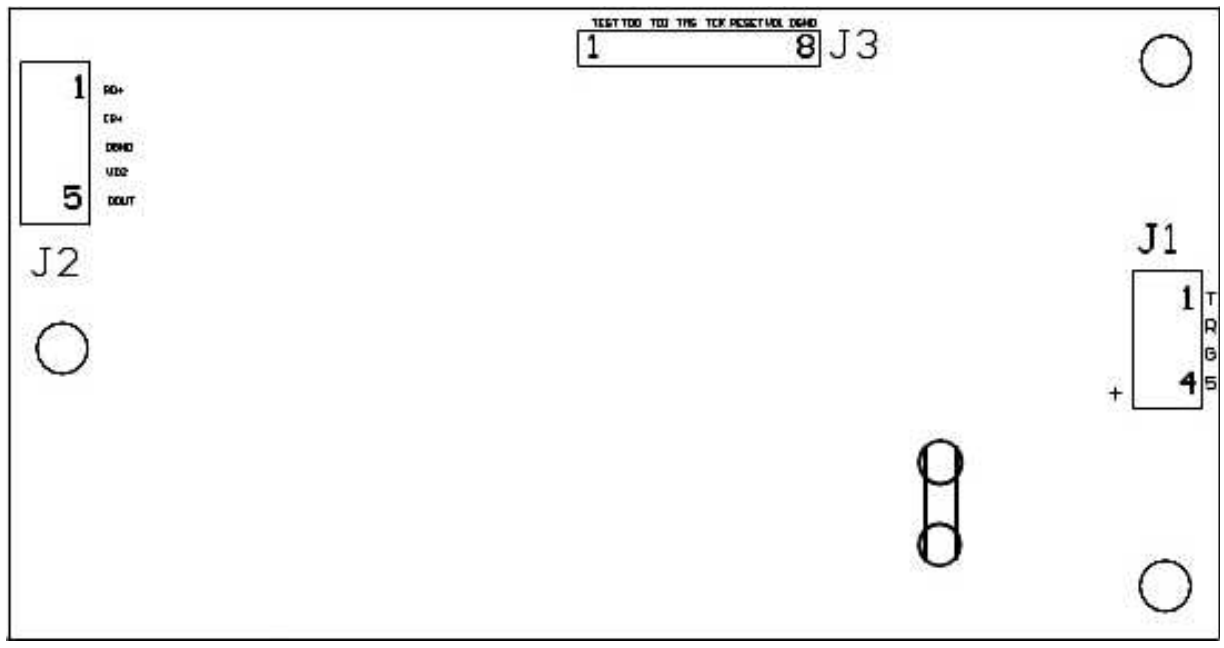


Figure 7-3 SpO_2 module Interface

Table 7-3 SpO_2 module Interface Introduce

Connector	Function	Definition
J1	Connect Main Board J11	4 PIN Interval: 2.00mm PIN 1~4: +12V, GND,TXD,RXD
J2	Connect LEMO Socket	5 PIN Interval: 2.54mm PIN 1~5: RD+, IR+,DGND,VD2,DOUT

7.3.3 CO_2 Link Module

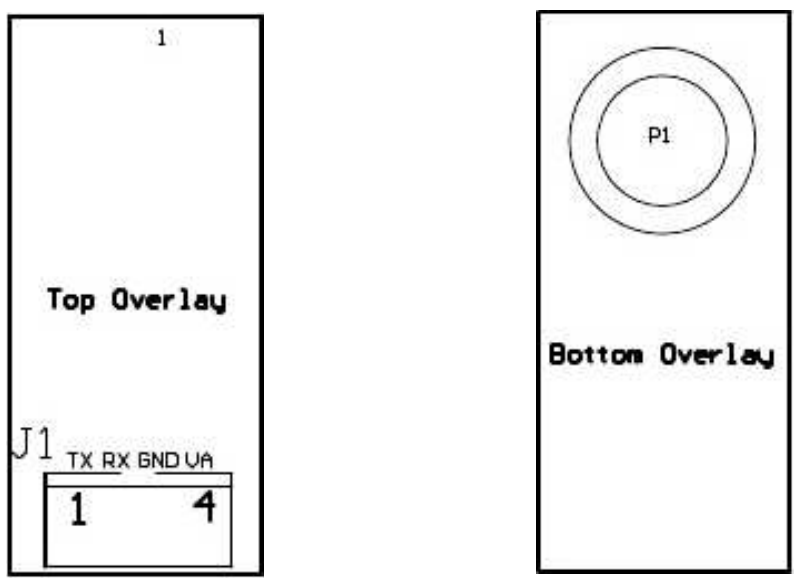


Figure 7-4 CO_2 link module Interface

Table 7-4 CO_2 link module Interface Introduce

Connector	Function	Definition
J1	Connect Main Board J9	4 PIN Interval: 2.00mm PIN 1~4: ,TXD,RXD , GND,+5V
P1	Connect LEMO Socket	8 Core

7.3.4 IBP Link Module

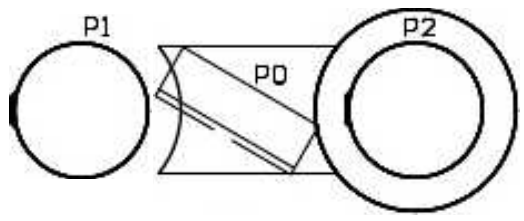


Figure 7-5 IBP Link Module Interface

Table 7-5 IBP Link Module Interface Introduce

Connector	Function	Definition
P0	Connect Integrative Module JIBP	6 PIN Interval: 2.00mm
P1	Connect ECG Socket	8 Core
P2	Connect ECG Socket	8 Core

7.3.5 Integrative Module

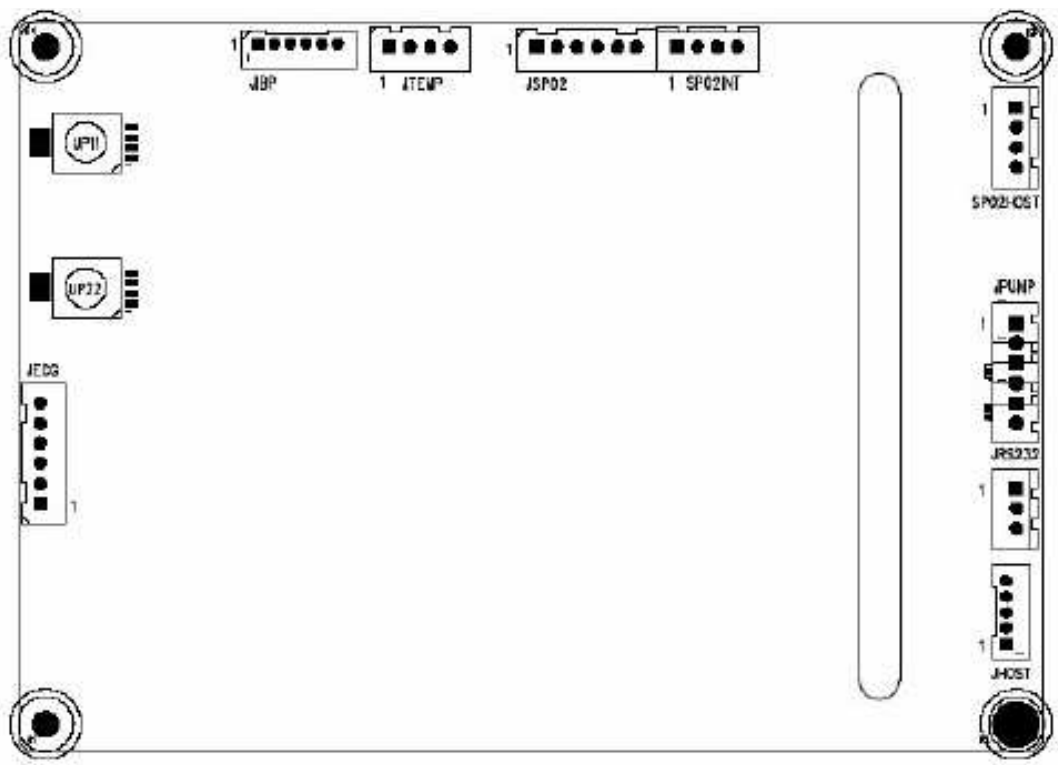


Figure 7-6 Integrative Module Interface

Table 7-6 Integrative Module Interface Introduce

Connector	Function	Definition
JHOST	Connect Main Board J15	6 PIN Interval: 2.00mm PIN 1~6: +5V,NIBP-EN, +8.4V, GND, TXD, RXD
JEGG	Connect ECG Cable	6 PIN Interval: 2.54mm
JSPO2	Connect Digital Oximeter probe	5 PIN Interval: 2.54mm PIN 1~5: FMOUT, +3.3V, RED+,RED-, GND
JTEMP	Connect Temperature probe	4 PIN Interval: 2.54mm PIN 1~4: T1, GND, T2, GND
JIBP	Connect IBP Link Module P0	6 PIN Interval: 2.00mm PIN 1~6:+2.4V,IBP1+,IBP1-,IBP2+,IBP2-, GND

7.3.6 Main Power Supply Module

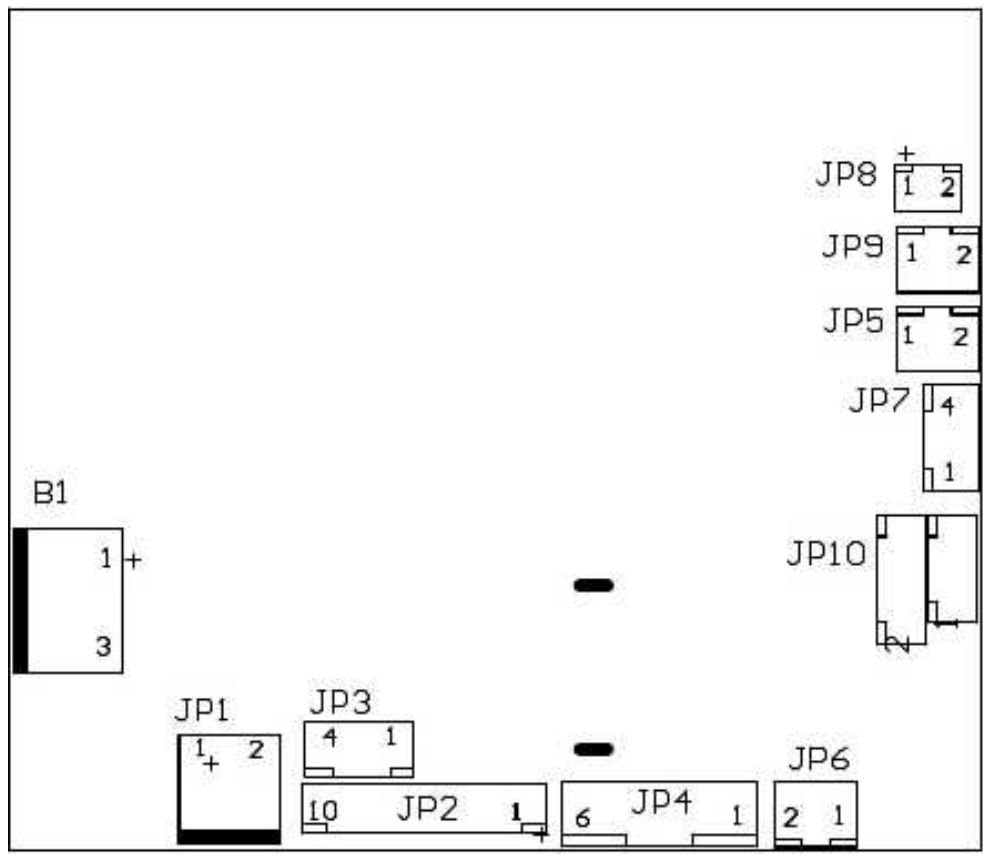


Figure 7-7 Main Power Supply Module Interface

Table 7-7 Main Power Supply Module Interface Introduce

Connector	Function	Definition
B1	Connect Battery	3 PIN Interval: 3.96mm PIN 1~3: +8.4V, GND, BC
JP1	Connect AC/DC Power Supply Module	2 PIN Interval: 3.96mm PIN 1~2: +9V，GND
JP2	Connect keyboard P2	10 PIN Interval:2.00mm PIN 1~10: BC, LCD_C, +5V, PC_ON, 9V, BATT, CHECK, GND, RXD, TXD
JP3	Connect Main Board J14	4 PIN Interval: 2.00mm PIN1~4: Vacancy, Vacancy, RXD, TXD
JP4	Connect Main Board J7	6 PIN Interval: 2.54mm PIN1~6: +5V,GND,8.6V,8.6V,GND,+5V
JP6	Connect Printer Module J1	2 PIN Interval: 2.00mm PIN 1~2: +8.6V，GND
JP7	Connect Converter	4 PIN Interval: 2.00mm PIN1~4: GND,+12V,GND+12V
JP8	Connect Fan	2 PIN Interval: 2.00mm PIN1~2: +12V,GND

7.3.7 AC/DC Power Supply Module

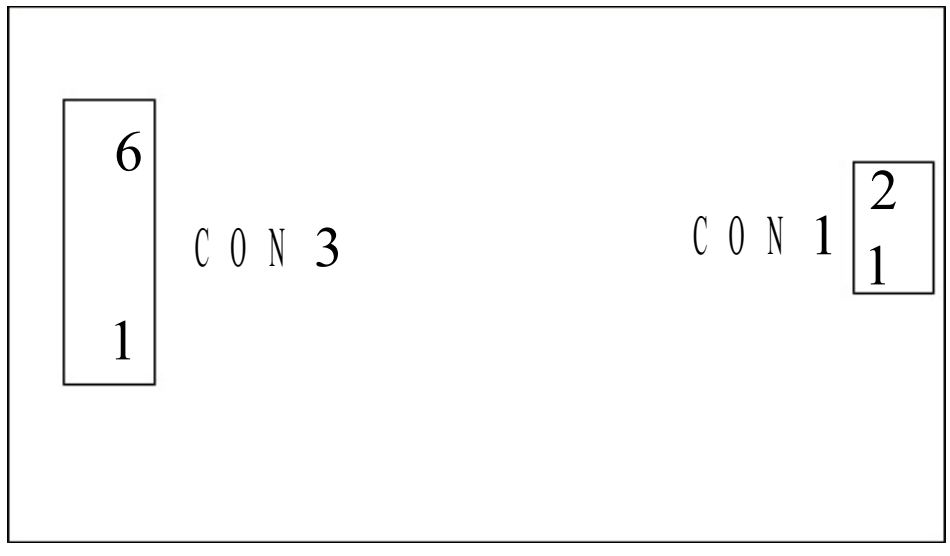


Figure 7-8 AC/DC Power Supply Module Interface

Table 7-8 AC/DC Power Supply Module Interface Introduce

Connector	Function	Definition
CON1	Connect Fuse Socket	2 PIN Interval: 3.96mm
CON3	Connect Main Power Supply Module JP1	6 PIN Interval: 3.96mm

7.3.8 Printer Module

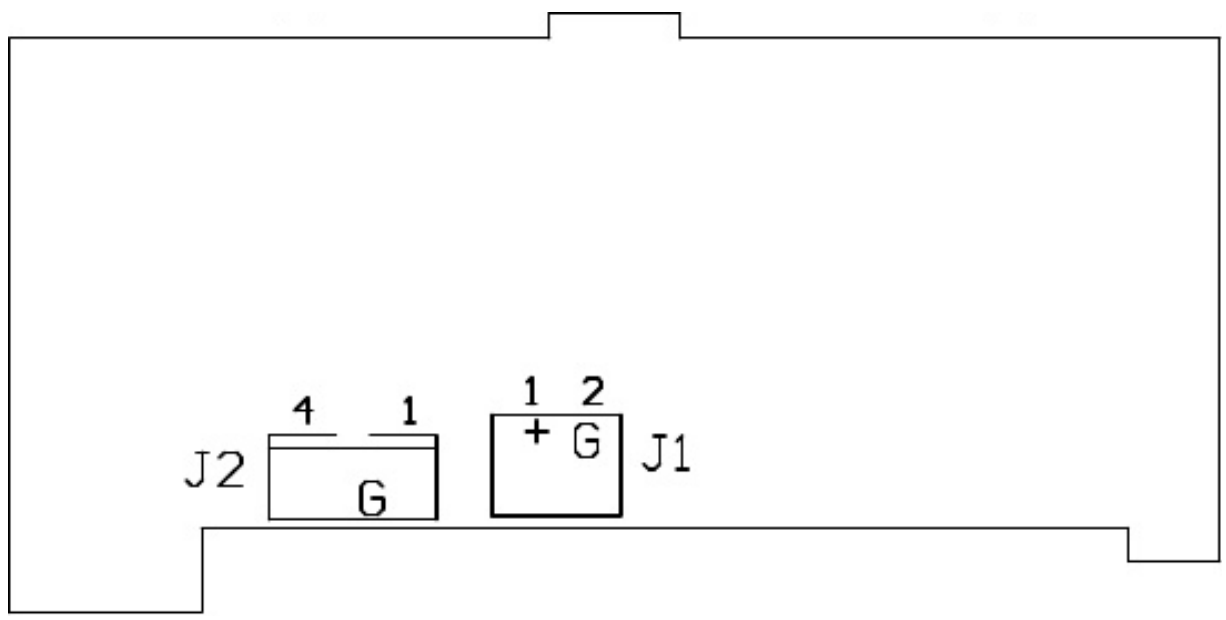


Figure 7-9 Printer Module Interface

Table 7-9 Printer Module Interface Introduce

Connector	Function	Definition
J1	Connect Main Power Supply Module JP6	2 PIN Interval: 2.00mm PIN 1~2: +8.4V，GND
J2	Connect Main Board J13	4 PIN Interval: 2.00mm PIN 1~4: +8.4V, GND,TXD,RXD

7.3.9 Keyboard

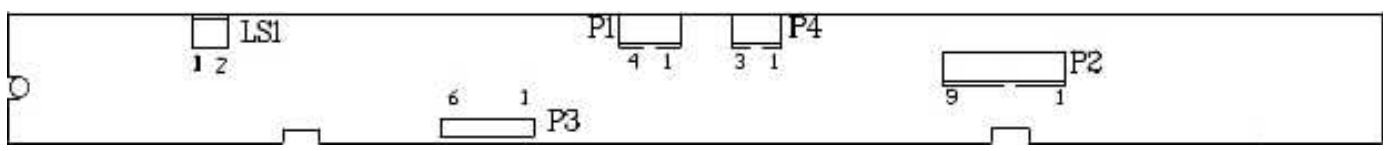


Figure 7-10 Keyboard Interface

Table 7-10 Keyboard Interface Introduce

Connector	Function	Definition
LS1	Connect Loud speaker	2 PIN Interval: 2.00mm
P1	Connect Rotary knob	4 PIN Interval: 2.00mm
P2	Connect Main Power Supply Module JP2	10 PIN Interval:2.00mm
P4	Connect State Light	3 PIN Interval: 2.00mm

7.4 Troubleshooting Sum-up

1．Can not turn it on

What's Perfomence:

①There is no display, the green working indicator donnot on, and the speaker donot say "DANG..."when you press the power on button. At the same time you have not plug in the 9V AC adapter.

②Same as the ① looks like ,the only difference is you have the 9V AC adapter plugged in this time

③There is no display or the screen flash once, but the green working indicator and the speaker and the rotator knob works properly(it speak the "DU,DU,DU"when you rotate the knob) "when you press the power on button. At the same time you have not plug in the 9V AC adapter.

How to check:

①Plug in the 9V AC adapter, if the monitor can turn on properly, it says that the battery is low capacity or the connection between battery with power supply board is poor. The worst thing is the built-in battery cannot hold a charge.

②The monitor cannot boot still when you plug in the AC adaptor . maybe the bad connection between the keypad and the power supply is the key fact. And Check if there is 8.4V output at the pin3 of JP4 of Power supply.

③Check if the connection between JP7 of power supply with invertor is good. Check if there is volt output at pin3 of JP4 and pin2，4 of JP7 of Power supply by a Digital electri Multimeter

You should contact our service staff if the module is broken.

2．Low Power ALARM even if the AC adaptor is plugged in

How to check:

Please be sure the AC input of Adaptor is right. Otherwise the adapte r maybe has been broken. Contact with our service staff.

3．The LCD splash or just white no wave display

How to check:

Please be sure the connection between LCD with mainboard is good and correct. Otherwise you should replace the signal wire of or the TFT LCD.itself

4．No ECG Wave

How to check:

①Check if the lead mode of ECG if right.

②Replace the patient cable to make sure the cable is good

③make sure the connection between ECG(integrative) module with Main board is good

5．Too much Noise in ECG waves

How to check:

Make sure the patient cable is good and has been placed rightly. And make the patient relax without moving.

6．The baseline of ECG drift

①The humidity is too high

②Please use the certificated probe and clean the chest clearly before placing.

7．The respiration signal too weak.

How to check:

Please use the certificated probe and clean the chest clearly before placing.

8．ECG Disturbance by the Electirc Surgecal Unit

How to check:

You should use the special patient cable which can ati-interference of the Surgecal Unit

9．No SPO_2 signal

What's performance:

There is no SPO_2 and the corresponding wave.

How to check:

①The type of SPO_2 sensor mismatch with CMS9000

②The SPO_2 sensor is broken, replace it.

③Bad connection between SPO_2 module with main board., the worst thing is the SPO_2 module broken.

10．Noise in SPO_2 wave

Please refer to the Warning and Cautions of SPO_2 section in User Manual of CMS9000

11．NIBP cannot inflate to the predefined presure.

How to check:

There must be air leakage, please check the presure tube or the cuff bag.

12．Module communicate error

What's performance:

"XXModule Communicate Error" banner is displayed on the top of LCD display.

How to Check:

Make sure the connection between these module with main board is good, otherwise you Should contact with our service staff.

Chapter 8 Maintenance Procedures

This section discusses the tests used to verify performance following repairs or during routine maintenance. All tests can be performed without removing the CMS8000 Patient Monitor 's cover. If the CMS8000 Patient Monitor fails to perform as specified in any test, repairs must be made to correct the problem before the monitor is returned to the user.

Equipment Required:

ECG Signal Simulator,Blood Pressure Signal Simulator,SpO_2 Signal Simulator, Temperature Simulator.

Data Sheet:

This procedure uses a Data Sheet as the record for verifying CMS8000 Patient Monitor performance. Once the procedure is completed, CMS recommends the Data Sheet be kept with the respective monitor's Device History Record should verification of monitor performance be questioned. The DATA SHEET can be found on Appendix 1.

ECG Check

1). Simulator Check

In measuring mode, connect the CMS8000 to a ECG simulator of appropriate type

Set the simulator to a value of 80bpm of HR(heart rate)

Verify the HR readings displayed on the LCD screen according to the allowd accessory reference to the User Manual's corresponding section.

SpO_2 Check

1). Oximetery Calibration Check

The Oximetery is factory calibrated, No user calibration required.

2). Simulator Check

In the measuring mode, connect the CMS8000 to a SPO_2 simulator of appropriate type.

Set the simulator to a SPO_2 value of 98% and a pulse Rate value of 60bpm, verify the SpO_2 and PR reading displayed on the LCD Screen according to the allowed accuracy

Reference to the User Manual

NIBP Check

1） Simulator Check

In measuring mode, connect the CMS8000 to a NIBP simulator of appropriate type.

Set the simulator to a value of 120/80

Press "START" button to allow the Monitor pick up the NIBP measurement.

Verify the NIBP readings displayed on the LCD screen according to the allowd accessory refernce to the User Manual's corresponding section.

Temperature Check

1) Temperature Calibration Check

The Temperature is factory calibrated, No user calibration required.

2). Simulator Check

In measuring mode, connect the CMS8000 to a Temperature simulator of appropriate type.

Set the simulator to a value of 28℃~45℃

Verify the Temperature readings displayed on the LCD screen according to the allowd accessory reference to the User Manual's corresponding section.

If you have opened and repaired the CMS8000 monitor, we recommend you do a ELECTRICAL SAFETY CHECKS.

Warning :
Do not touch the monitor when performing these tests

Chapter 9 Service Procedures

This section discusses the replacement of the major assemblies found inside the monitor.

Warning :

Before attempting to open or disassemble the Monitor, disconnect the power cord from the monitor and remove the battery.

Caution :

Removal of the "warranty void if removed" sticker voids any warranty the monitor may have.

Tools Required:

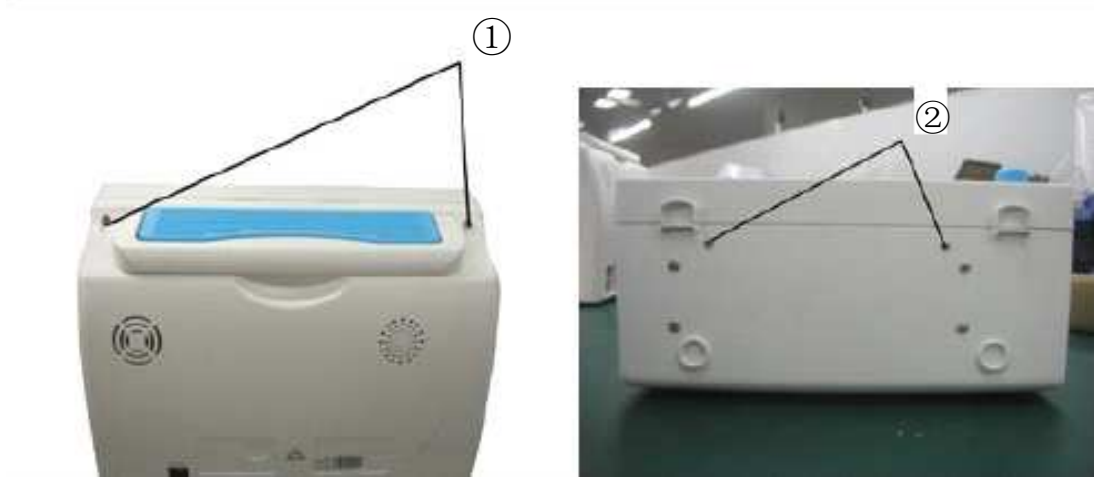
Screwdriver、91% Isopropyl Alcohol.

9.1 Monitor Disassembly

1)Complete the steps in prior to disassembly.

2)Set the monitor face down to a soft surface being careful not to scratch the front display.

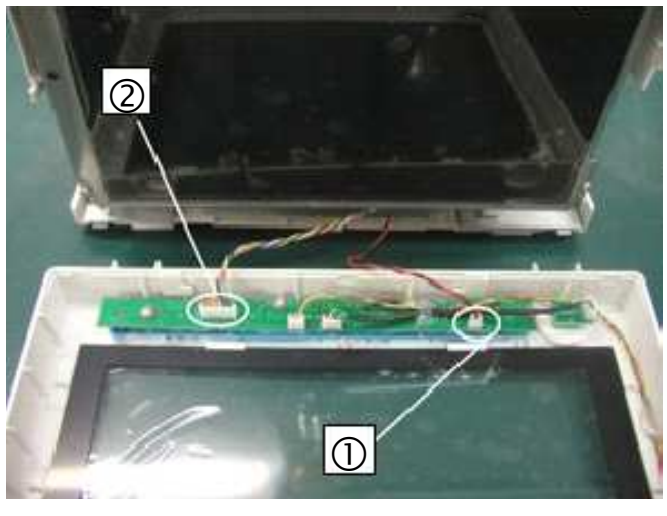
3)Remove the two ST2.9*10 and two M3*6 corner screws that secure the two case halves together.



①ST2.9*10 corner screws

②M3*6 corner screws

4)Separate the monitor's front and rear cases, disconnect the two harnesses(mentioned by white circles) assemblies from the KEY BOARD, being careful not to stress the internal wire harnesses.

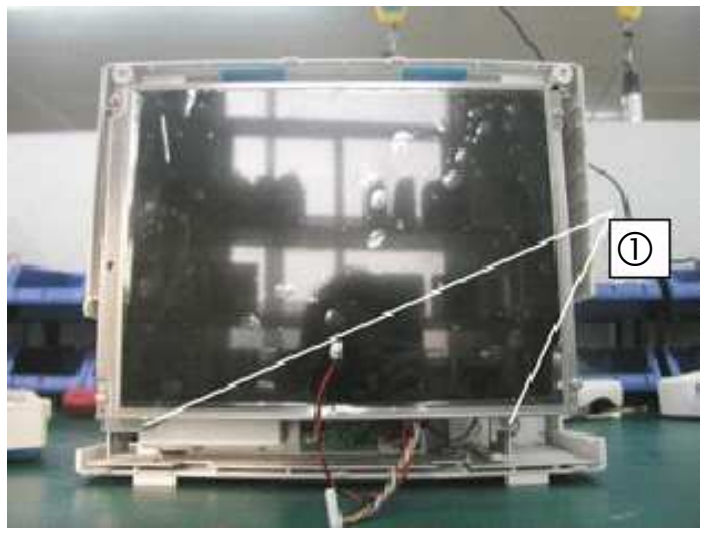


①harness assemblies from KEY to speaker

②harness assemblies from KEY to Main Power Supply MODULE

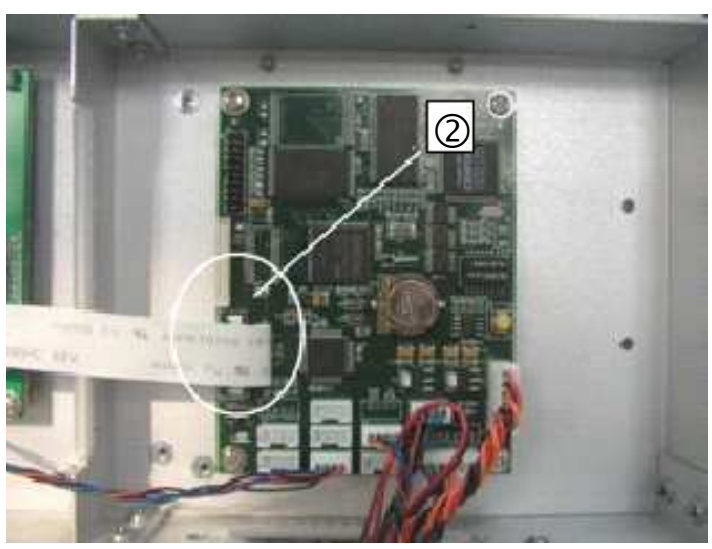
5) Remove the LCD display module：

A. Remove the corner screws showed with white line as following picture



①M3*6 corner screw

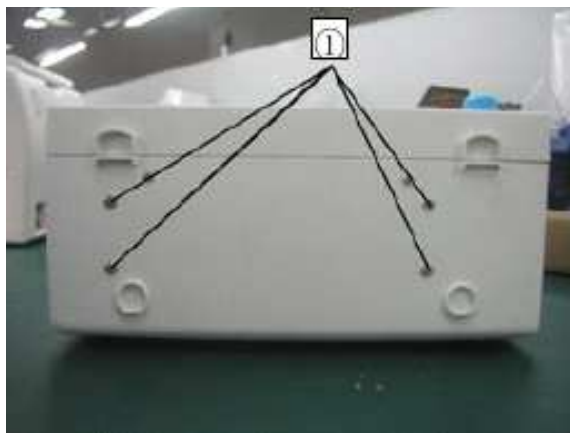
B. After remove the corner screws， we can remove the LCD metal skeleton from the main metal skeleton.Disconnect the wire harness(showed with white circles in picture), being careful not to stress the wire harnesses.



①harness assemblies from converter to Main Power Supply Module

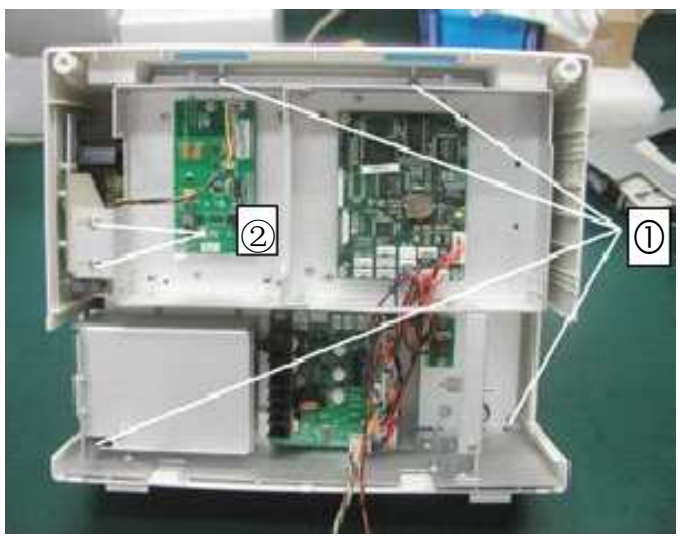
②harness assemblies from LCD Line to Mainboard

6) Remove the four corner screws at the bottom of monitor as following photo.



①M4*10 corner screw

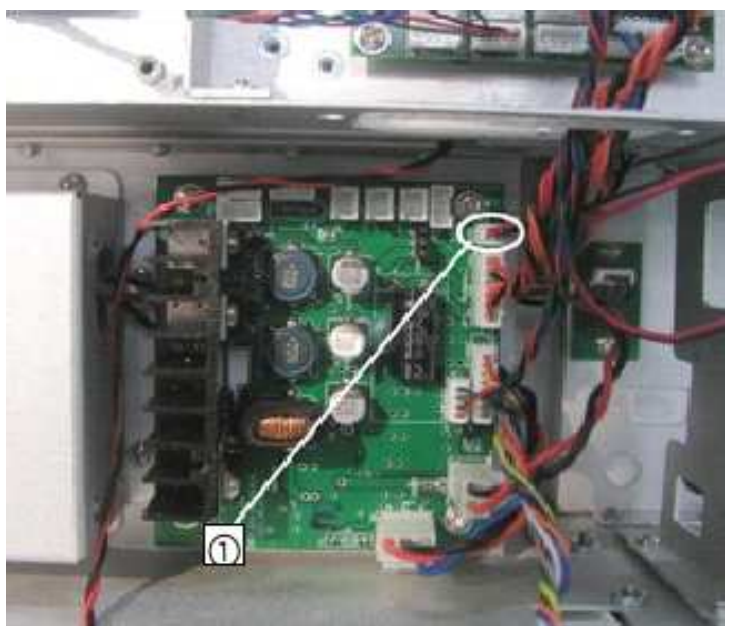
Remove the four corner screws that secure the interior skeleton with rear case and the two screws that secure the left side skeleton as following photo.



①ST2.9*10 corner screw

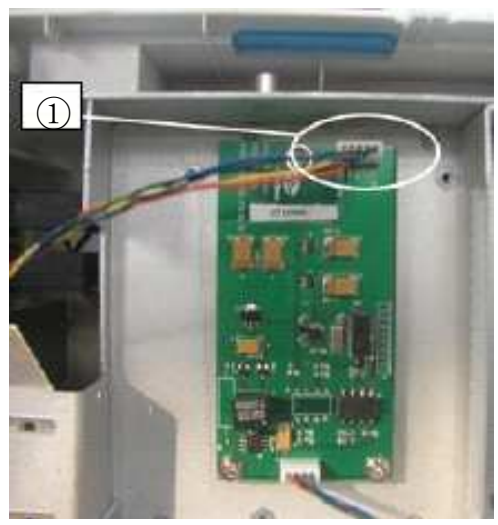
②M3*6 corner screw

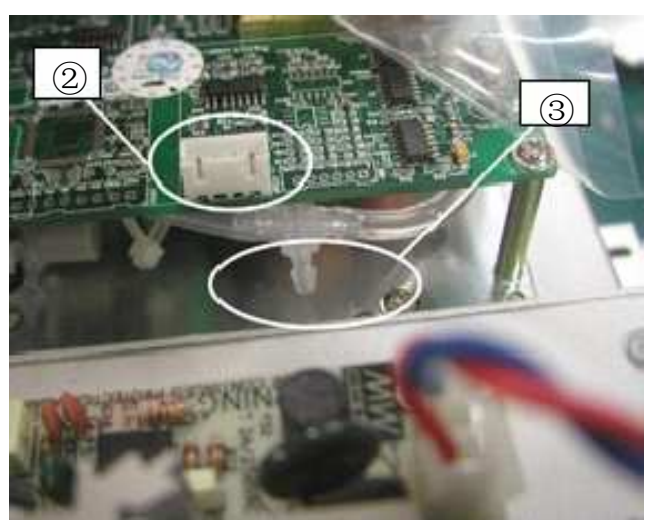
7)Disconnect the wire harnesses as photo, being careful not to stress the wire.

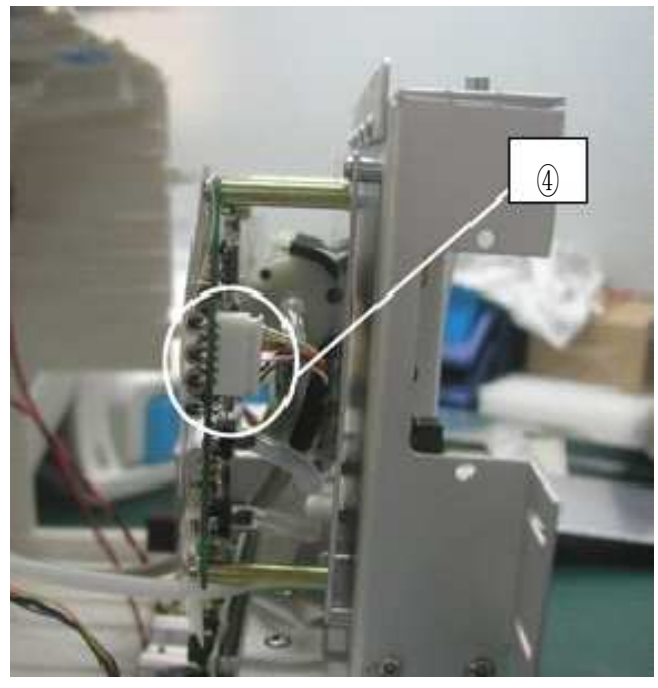


①harness assemblies from Main POWER supply module to FANS

8)Pull out the interior skeleton carefully. Disconnect the wire harnesses as photo, being careful not to stress the wire.

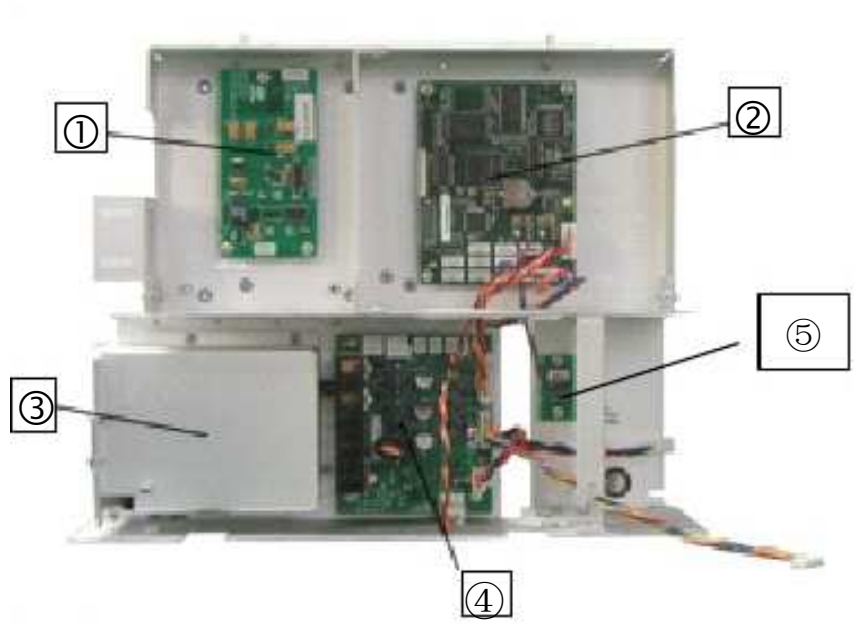




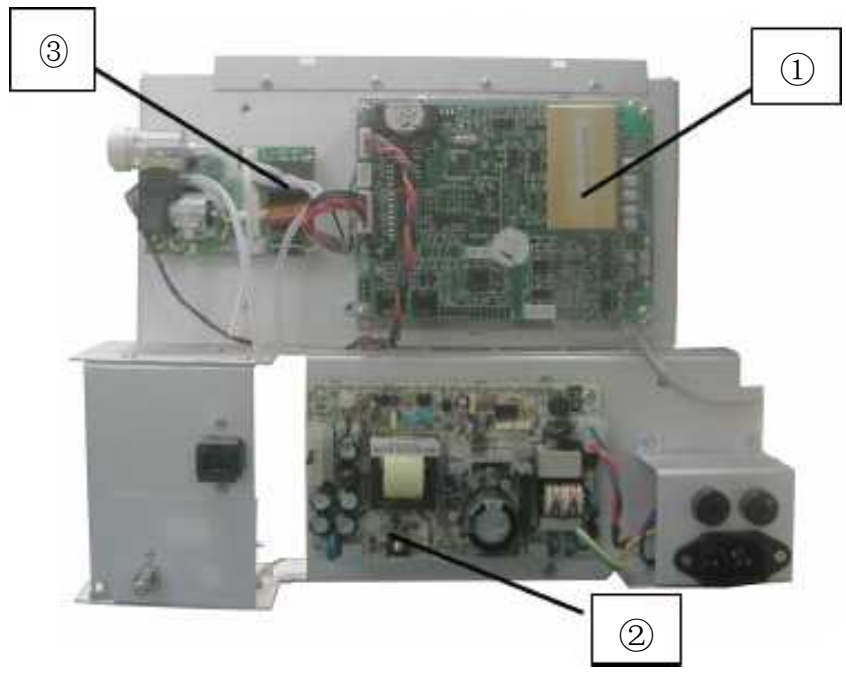


①harness assemblies from SpO_2 module to LEMO Socket
②harness assemblies from Integrative Module to temperature socket.
③harness assemblies from Integrative Module to Blood Pressure socket.
④harness assemblies from Integrative Module to ECG socket.

9)Now all of the module is there, you can replace them one by one(noting and remembering which wire assembling to which socket)



①SpO_2 module
②Main Board
③Battery case
④Main POWER Supply Module
⑤Network Board



①Integrative Module
②AC/DC POWER Supply Module
③CO_2 Link Module

9.2 Monitor Assembly

1)Using four M3 * 6 screw fixed the AC/DC Power Supply Module to the interior metal skeleton.

2)Using four M3 * 6 screw fixed the Integrative Module to the interior metal skeleton.

3)Using M3 * 5 screw fixed the CO_2 Link Module to the interior metal skeleton.

4)Using four M3 * 6 screw fixed the Main Board to the interior metal skeleton.

5)Using two M3 * 6 screw fixed the Network board to the interior metal skeleton.

6)Using three M3 * 6 screw fixed the SpO_2 module to the interior metal skeleton.

7)Using six M3 * 6 screw fixed the Battery case to the interior metal skeleton.

8)Using four M3 * 6 screw fixed the Main POWER Supply Module to the interior metal skeleton.

9) Connect inserted all lines.

10)Turning on and testing whether various functions are normal.

11)Using four M4 * 10 screw fixed the interior metal skeleton and the bottom of the rear panel.

12)Using four ST2.9*10 screw fixed the interior metal skeleton and the around of the rear panel.

13)Using two M3*6 screw fixed the interior metal skeleton and the LCD metal skeleton.

14)Using two M3*6 screw fixed the front panel and the bottom of the rear panel.

15)Using two ST2.9*10 screw fixed the front panel and the rear panel.

9.3 Replacing The Main Power Supply Module

Main Power Supply Module can be found on the underside of the interior metal skeleton.

Removing The Main Power Supply Module:

1）Follow steps in Monitor Disassembly，disconnect the wire harness from the main power supply module port B1, JP1, JP2, JP3, JP4, JP6,JP7,JP8.

2）Take down the interior metal skeleton.

3）With screwdriver unloaded the four M3 * 6 screw fixed Main power supply module.

4）Carefully remove main power supply module.

Installing The Main Power Supply Module:

1）With four M3 * 6 screw fixed main power supply module.

2）Follow steps in Monitor Assembly,connect the wire harness with the keyboard, main board , converter, battery, AC/DC power supply module , Printer and fan .

3）As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.4 Replacing The SpO_2 Module

SpO_2 Module can be found on the top left corner of the interior metal skeleton.

Removing The SpO_2 Module :

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the SpO_2 module port J1 and J2 .

2）Take down the interior metal skeleton.

3）With screwdriver unloaded the three M3 * 6 screw fixed SpO_2 module.

4）Carefully remove SpO_2 module.

Installing The SpO_2 Module :

1）With three M3 * 6 screw fixed SpO_2 module.

2）Follow steps in Monitor Assembly,connect the wire harness with the main board and lemo socket.

3）As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.5 Replacing The Main Board

Main board can be found on the top right corner of the interior metal skeleton.

Removing The Main Board:

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the main board port J5, J7, J8, J9, J11, J12, J13 , J14.andJ15.

2）Take down the interior metal skeleton.

3）With screwdriver unloaded the four M3 * 6 screw fixed main board.

4）Carefully remove main board.

Installing The Main Board:

1）With four M3 * 6 screw fixed main board.

2）Follow steps in Monitor Assembly,connect the wire harness with LCD line , Main power supply module、network board, CO_2 Link module,SpO_2 Module, printer module and Integrative module.

3）As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.6 Replacing The Network Board

Network board can be found on the below right corner of the interior metal skeleton.

Removing The Network Board:

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the network board port.

2）Take down the interior metal skeleton.

3）With screwdriver unloaded the two M3 * 6 screw fixed network board.

4）Carefully remove network board.

Installing The Network Board:

1）With two M3 * 6 screw fixed network board.

2）Follow steps in Monitor Assembly,connect the wire harness.

3）As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.7 Replacing The Integrative Module

Integrative Module can be found on the behind the top of the interior metal skeleton.

Removing The Integrative Module:

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the Integrative Module port JHOST, JECG,$JSPO_2$,JTEMP and JIBP.

2）Take down the interior metal skeleton.

3）With screwdriver unloaded the four M3 * 6 screw fixed Integrative Module.

4）Carefully remove Integrative Module.

Installing The Integrative Module:

1）With four M3 * 6 screw fixed Integrative Module.

2）Follow steps in Monitor Assembly,connect the wire harness with main board , ECG socket and

digital oximeter probe ,temperature probe and IBP link module.

3）As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.8 Replacing The AC/DC Power Supply Module

AC/DC power supply module can be found on the behind of the interior metal skeleton.

Removing The AC/DC power supply module:

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the AC/DC power supply module port CON1 and CON2.

2) Take down the interior metal skeleton.

3)With screwdriver unloaded the four M3 * 6 screw fixed AC/DC power supply module.

4)Carefully remove AC/DC power supply module.

Installing The AC/DC power supply module:

1)With four M3 * 6 screw fixed AC/DC power supply module.

2)Follow steps in Monitor Assembly,connect the wire harness with Fuse and main power supply module .

3)As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

9.9 Replacing The CO_2 Link Module

CO_2 Link module can be found on the behind of the interior metal skeleton.

Removing The CO_2 Link module:

1）Follow steps in Monitor Disassembly,disconnect the wire harness from the CO_2 Link module port J1 and P1.

2) Take down the interior metal skeleton.

3)With screwdriver unloaded the M3 * 5 screw fixed CO_2 Link module.

4)Carefully remove CO_2 Link module.

Installing The CO_2 Link module:

1)With M3 * 5 screw fixed CO_2 Link module.

2) Follow steps in Monitor Assembly,connect the wire harness with main board and lemo socket.

3)As the Monitor Assembly above, fixed the interior metal skeleton , the rear panel and the front panel.

Appendix1 CMS8000 Patient Monitor Data Sheet

Monitor Name	CMS8000 Patient Monitor	Serial Number		Verify Date	
Tested By		Temperature	℃	Humidity	%RH
Verify Item	Content And Request				Result
Appearance	No scratch, blemish damage and deformation				
Symbol	Clear, accurate, complete, solid paste				
Components	Testing the various components assembled integrity				
Keystrok, indicator light, LCD	Location correct; operating flexibility; showed normal				
Self-check	Alarm light blinking orange light once issued a ringing				
Display	All power waveform observation whether it is normal for the regional waveform drawing				
Adjust	ECG menu, select OTHER SET (ECG other set) in the ECG CAL (ECG calibration) whether it is normal for calibration observation. Accurate observation after they choose this, and stop calibration, and withdraw from the menu.				
ECG Check	View ECG waveform, waveforms breathing, heart rate and respiration rate of whether abnormalities. The normal ECG I, II, V waveform upward, downward AVR waveform.				
SpO_2 Check	Connecting oxygen probe to check oxygen saturation values and oxygen availability waveform .				
NIBPCheck	Connecting blood pressure cuffs, initiated by START measurement, the measurement results observed normal.				
Temperature Check	Monitor displays correct Temperature value.				
Collocate Check	Pressing MAIN button, enter MAINTAIN (machine maintenance) in the choice of FAC (manufacturers maintenance), check whether the temperature probe type and configuration consistent. MODULE SETUP (Switch Module) check whether the printer status and configuration switches consistent, functional module configuration consistent with the switch.				
Charge Function	Check whether battery can charge normal.				
Reject Serial Number, Phenomenon, Resolvent					