



CardioXP

Operation Manual

Ver. 1.2

Warranty

- This product was made through strict quality control and examination. The repair and compensation standards follow the consumer damage compensation regulations of the Ministry of Finance and Economy.
- The warranty for this product runs for 1 year. (2 years in EU) But the warranty for accessory runs for 6 months.
- This product is guaranteed against faulty workmanship for a period of 1 year. Under this warranty, we undertake to repair free of charge at our service centers.
- When having troubles during this period, please inform us the model name, serial number, date of purchase and a description of the problem you are experiencing.

Caution
Federal law restricts this device to sale by or on the order of a physician

Contact Bionet

Contact Us

If you have any questions or comments relating to our products or purchasing, please contact the telephone numbers or E-mail below. You can talk to our sales people. Bionet always welcome your enquiries. Please contact us.

- Product and purchasing → TEL: +82-2-6300-6418
- After sales service → TEL: +82-2-6300-6458

※ When the product is not operating correctly, please contact our customer service center with the name of the model, serial number, and a description of the problem you are experiencing.

Product purchase and accessory order

Please contact us or retailer for the information about product purchase or accessory order.

- TEL: +82-2-6300-6418 / E-mail: sales@ebionet.com

Technical assistance

Please contact this number for technical assistance.

- TEL: +82-2-6300-6458 / E-mail: service@ebionet.com

Fee-based Service

If you wish to make a claim when the product is damaged through misuse, we charge repair fee. Please read the manual before you make a claim.

<ul style="list-style-type: none"> - For simple inspection without giving instruction or disassembling the product - For reinstalling due to poor installation by the retailer 	<p>Fee charged: From the second time Free of charge: One time</p>
<ul style="list-style-type: none"> - For poor installation due to moving - For reinstallation after initial installation due to customer's require - For reinstallation due to customer's unskilled installation - For offering service when a foreign substance is put or mis-cleaned by the customer 	<p>Fee charged</p>

1. The warranty does not cover cleaning, adjusting and instruction for use. (Separate standard will apply when repair is impossible)

2. A fault of customer

When the product is damaged or broken due to customer's improper use or misuse

- When the power cord is replaced improperly by the user
- When the user drops the product while moving, after the initial installation
- When the user uses unauthorized accessories
- When the product is repaired by unauthorized person

3. Others

- When the product is damaged by a natural disaster (fire, flood or earthquake)
- When durability of accessories ends

Definition of WARNING, CAUTIONS and NOTE

- In order to stress the contents of this manual, we define the terms as below. Please follow the warning and cautions instruction.
- The manufacturer or service agents are not responsible for the damage resulting from inappropriate use or carelessness.

WARNING

There might be serious injury, fatal accident or financial damage when you violate this instruction

CAUTIONS


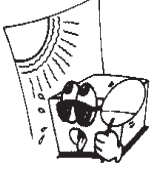
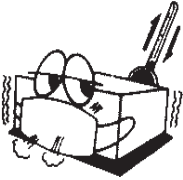
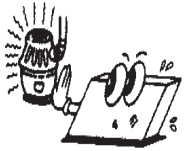
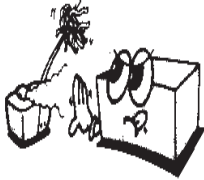
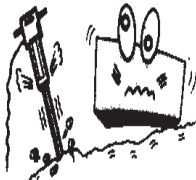
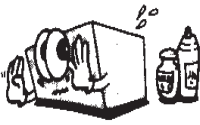


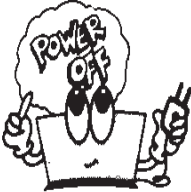
There might be slight injury or damage when you violate this instruction

NOTE

There might not be any dangerous events, but it is important to note this instruction for installation, use, maintenance or repair

Environment Instructions

- Please do NOT use or place the product in such an environment explained below.

	<p>Steamy environment. Do not use the product with wet hands.</p>		<p>Direct sunlight.</p>
	<p>Place where the temperature and humidity condition are extreme (Recommended temperature and humidity range for use are 10-40°C and 30-85%, respectively.)</p>		<p>Near electronic heaters</p>
	<p>High humidity or ill-ventilated place</p>		<p>Place where excessive shock or vibration may occur</p>
	<p>Place exposed to chemicals or explosive gas.</p>		<p>Please note there is no dust or metal in the product.</p>
	<p>Do not disassemble the product. The product warranty does not cover problems resulting from disassembling the product.</p>		<p>Do not plug the power supply cord before installing the product completely. It may cause damage on the product.</p>

Safety Instructions for electricity

Please note the following precautions before using the product.

- Is the power supply cord proper? (100 - 240V AC)
- Is every cord connected properly to the product?
- Is the grounding connected correctly? (Otherwise, noise can occur.)

NOTE

In order to avoid noise, do not place the product near a power generator, X-ray equipment, broadcast equipment or mobile electric cord. It may cause inaccurate result. It is important to use an independent electric circuit and stable grounding. When using with other appliances together with an outlet, the result may be inaccurate.

NOTE

The classification of CardioXP is as below.

- Its classification against electric shocks is Class I , Type-CF.
- It is not proper to use this product near an inflammable anesthetic or a solvent.
- IEC/EN 60601-1(Safety of Electric Medical Equipment) standard, Noise events: A class & IEC/EN60601-1-2(Electromagnetic Compatibility Requirements) standard, Noise level: B
- IEC/EN60601-2-25(Safety of Electrocardiograms), UL2601-1(US General Requirements for Safety)

NOTE

Diagnosis of CardioXP needs to be confirmed by medical specialists.

NOTE

The accessories connected to analog or digital connector should be authorized in accordance with IEC standards. (E.g. IEC 950 for data processing equipment and IEC 601-1 for medical equipment) Moreover, every composition should correspond with EN 60601-1:1993.










WARNING

This equipment must only be connected to a supply mains with protective earth.

WARNING

Do not touch accessible connector pins and the patient simultaneously

Safety Symbols

Symbols	Contents
	Isolated patient connection. (IEC 601-1-Type CF)
	ECG Signal Input Port
	This symbol identifies a safety note. Ensure you understand the function of this control before using it. Control function is described in the appreciate operation manual.
	Conductor provides a connection between equipment and the potential equalization bus bar of the electrical installation
	AC Power
	External Signal IN/OUT Port
	External Signal Video Port
	External Signal Ethernet Port
	External Signal USB Port

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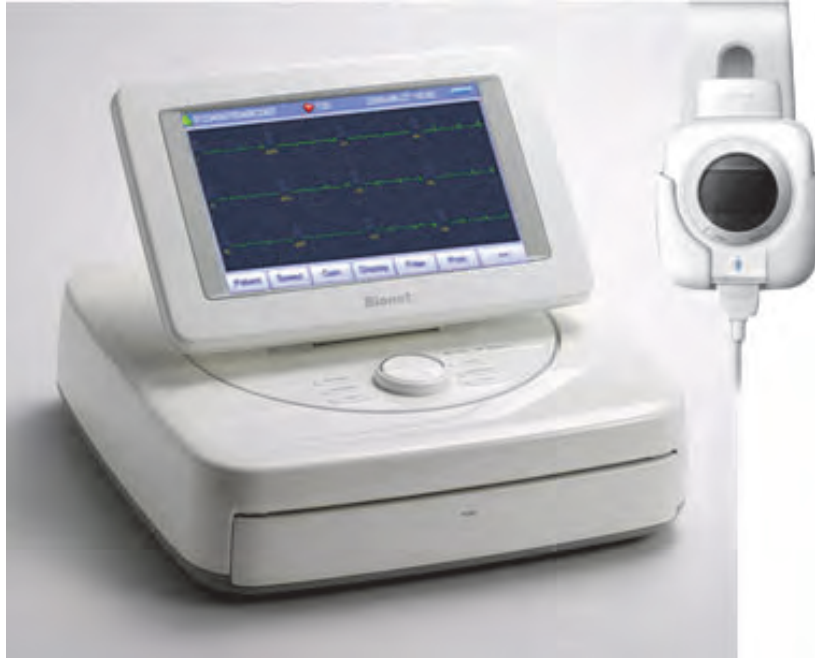
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1. General Information

- 1) Overviews of the product
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- 3) Components of the product
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 - Main components
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 - Graphic display LCD
 - Operation panel
- 4) System installation
 - Precautions for installation
 - Connecting power supply
 - Connecting patient signal module
 - Connecting wire mode
 - Connecting wireless mode
 - Installing the recording paper
- 5) System Setting
 - Setting Initialization
- 6) System Starting

1) Overviews of the product



Cardio XP is medical equipment with 12 channels to measure and record the patient's ECG.

It provides parameters for diagnosis and automatic diagnosis, but also is effective to manage the charts of the user as the user can print out the patient's information of the record of patient's ECG. It is also possible to manage the digital files by transferring the stored data to PC connected to the network.

In addition, for the convenience of the user, it is possible to measure ECG, apply the filter, save the ECG data, extract the parameter, diagnose automatically and print out the result with only one click. Also, as the user can tilt and rotate the LCD monitor, the user can check the data on the screen at any location.

If a battery (optional accessory) is inserted, it is possible and easy to carry the product for mobile examination or emergency.

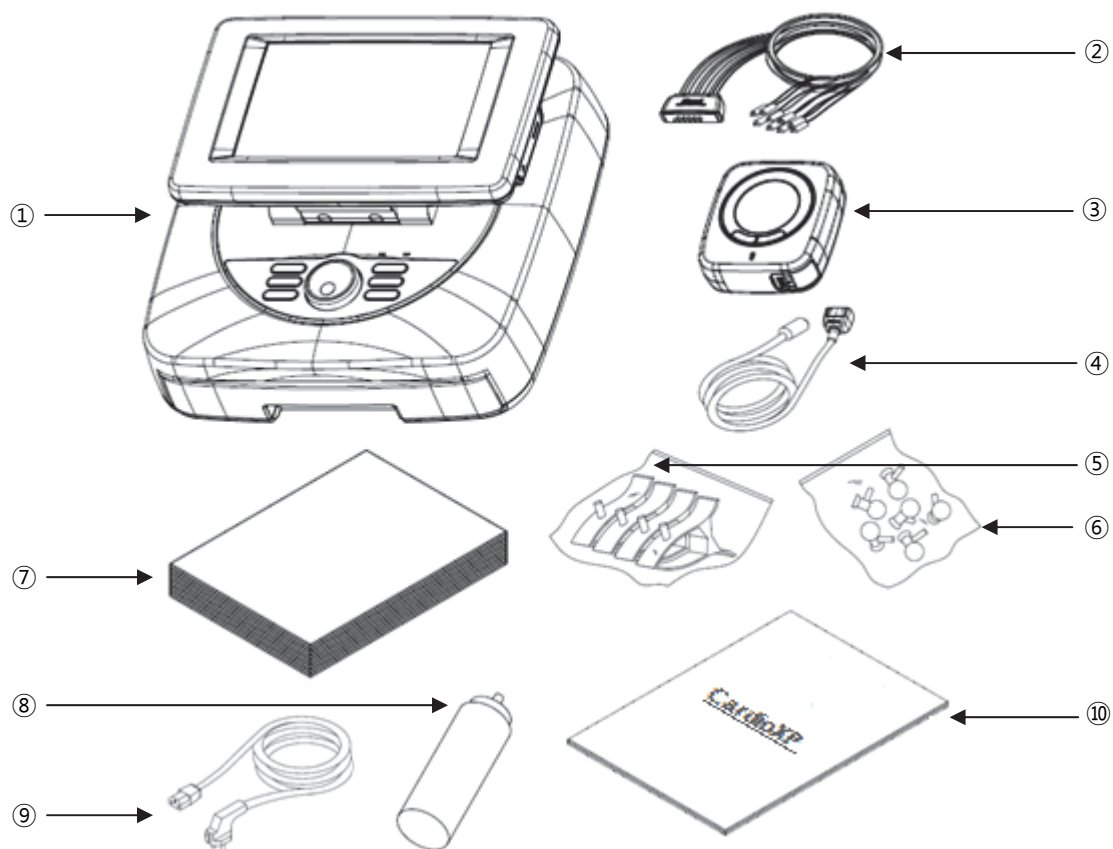
When using a wireless pack, it is possible to move freely, because there is no need for a line between the products with the patient.

2) Characteristics of the product

- 12ch ECG waveform consists of various channels, such as 3ch+1rhythm, 3 ch+3 rhythm or 6ch+1rhythm. The result is printed in the A4 size chart paper.
- The rhythm of 1 channel is stored for 60 seconds and printed in the A4 size chart paper.
- Real time 12 channel rhythm can be printed out simultaneously.
- Heart beat PR interval, QRS interval, QT interval, QTc and P-R-T axis, necessary for diagnosis, are calculated automatically and printed with ECG.
- The result can be gained through automatic diagnosis.
- It helps diagnosis as it is possible to print out the result after changing filter setting, signal size, printing speed, channel composition or rhythm setting of previously saved ECG data.
- It is easy to manage the printing papers by adapting Z-Folder Printer.
- It is effective to manage the patient's charts, as the user can input and print out the patient's information.
- It is possible to have a built-in battery, which makes it easy for carrying and moving.
- Wireless measure is possible by adapting the Wireless Patient Module (Optional).
- It is easy and convenient to use anywhere as the user can rotate, tilt and wall mount the equipment due to its new concept of design.
- More than 120 patient's data can be saved and transferred to another PC through LAN as well as through SD Card or USB Memory.
- It offers various protocols to make it possible to link with hospitals' computing networks. Also File and Order Database are strengthened.

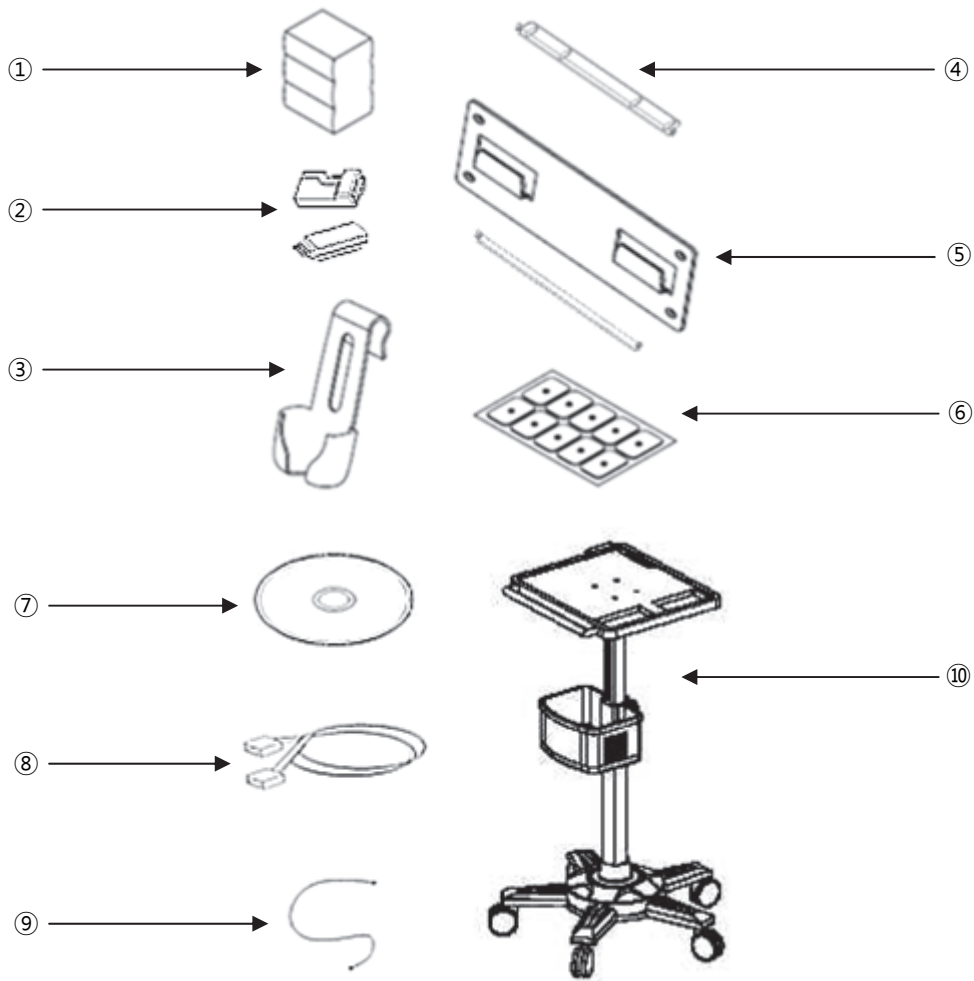
3) Components of the product

These are the components of the product. Please make sure that the following basic components and accessories are supplied. Also, please check whether the components, including accessories are working well.



Basic components and accessories

- Cardio XP Hardware (1 EA): ECG recording machine
- Patient cable (1 EA): It transfers the patient's ECG signal from an electrode to the module (11 Pin)
- Patient signal module (1 EA): It processes the patient's ECG signals
- Cable (1 EA): It transfers the patient's ECG signal from the module to the hardware (8 Pin)
- Limbs electrode (1 SET): It's connected with patient's body
- Chest electrode (1 SET): It's connected with patient's chest
- ECG chart (1 EA): It's for recording the ECG result
- ECG gel (1 EA): It's for applying on the patient's skin when measuring ECG
- Power cable (1 EA): It's a lead to connect power
- Operation manual & Diagnosis guide (1 EA): Operation manual & diagnosis guide

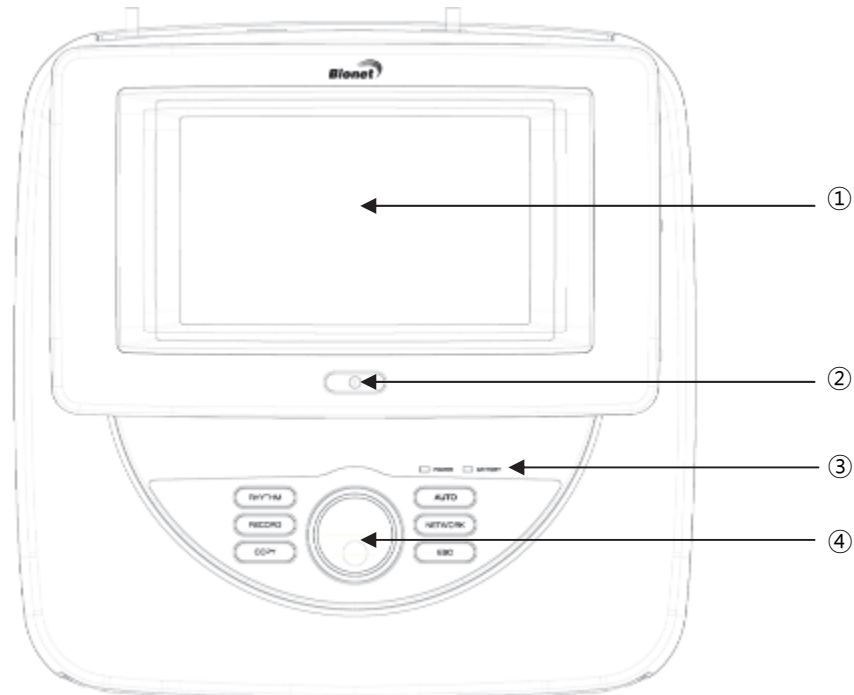


Options

- Battery pack (1 EA)
- Wireless pack & dongle (Each 1 EA)
- Patient's signal module cradle (1 EA)
- Paper guider for Letter (1 EA)
- Wall panel & Paper guider (Each 1 EA)
- Disposable electrode (10 EA)
- PC Software CD (1 EA)
- LAN Cable [Ethernet-RJ-45] (1 EA)
- Protective earth line (1 EA)
- Cart (1 EA)

Main components

■ Upper View



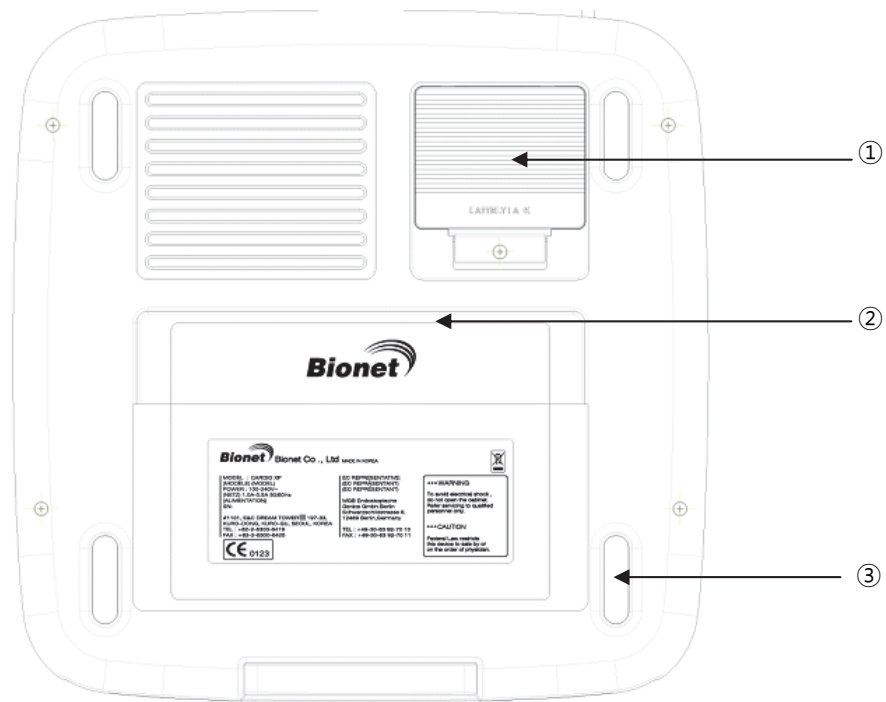
① LCD: It shows the product's operation state

② Power switch: It turns on or off the product

③ LED: It shows the power & battery state

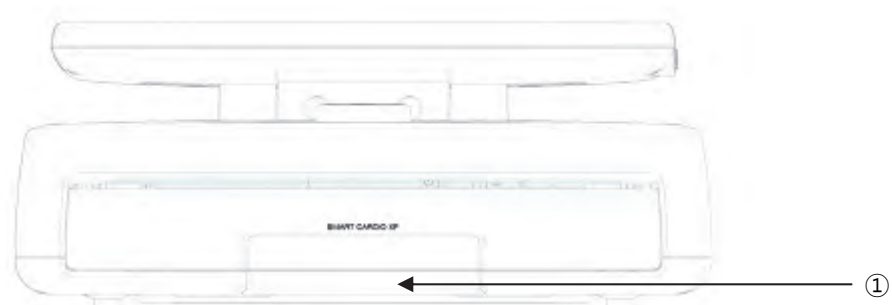
④ Control Unit (Key & Rotary switch): It's to input the patient's information and to select the functions

Lower View



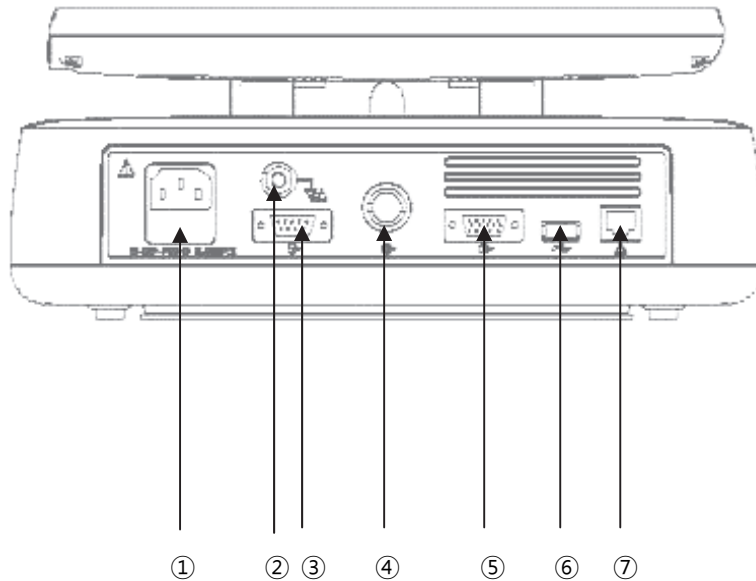
- ① Battery Cover: to insert the batteries
- ② Wall Mount Panel Socket: to fix the product on the wall
- ③ Foot Rubber

Front View



- ① THERMAL PRINTER: It prints out the patient's ECG waveform or various analysis results

■ Rear View

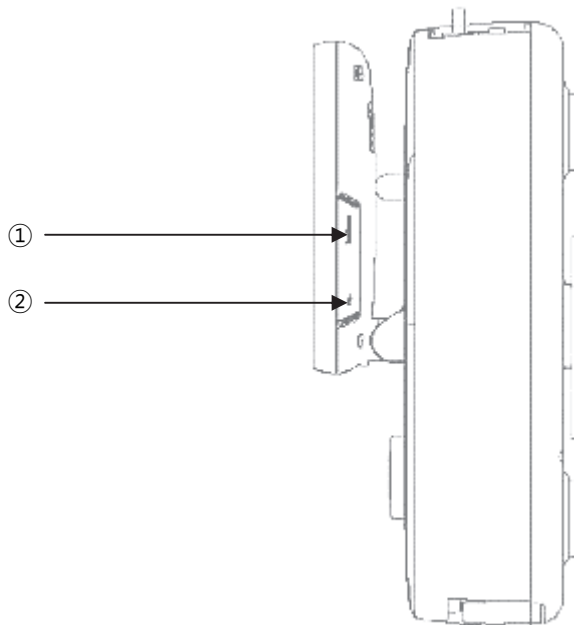


- ① AC power terminal: It can be connected to AC power supply
- ② Grounding terminal: It can be connected to the external grounding terminal when there is no protective earth
- ③ Serial Port: It's for telecommunication between external equipments.
- ④ Patient signal module socket: It can be connected to patient's signal module cable
- ⑤ External monitor socket: It can be connected to the external monitor
- ⑥ USB Port: It's for telecommunication between external equipments and USB
- ⑦ LAN Port: It's for telecommunication between external equipments and LAN

■ Left View



■ Right View



SD Card Socket: It's for inserting SD Card

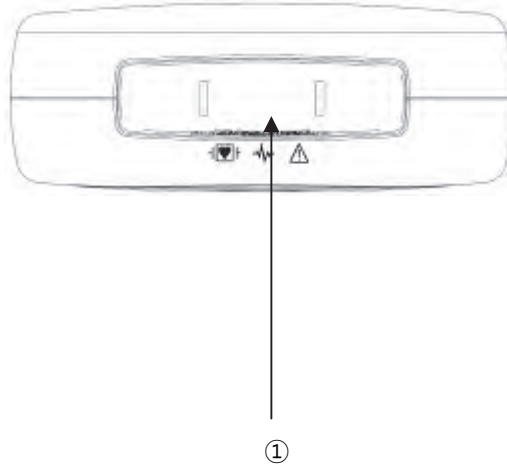
USB Port: It's for telecommunication between external USB equipments.

WARNING

It is strictly prohibited to open the cover because of electric shock.
Only an authorized person can disassemble the product.

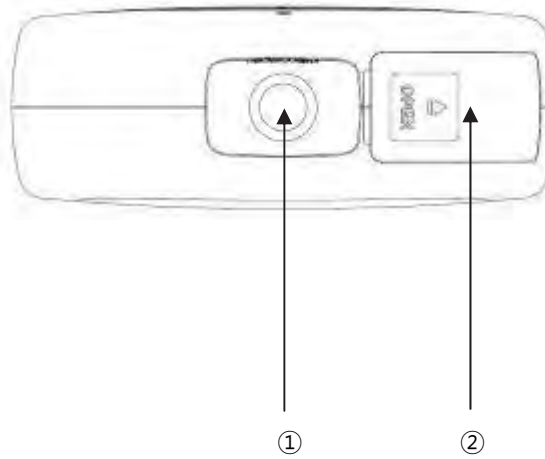
Patient signal module

■ Upper View



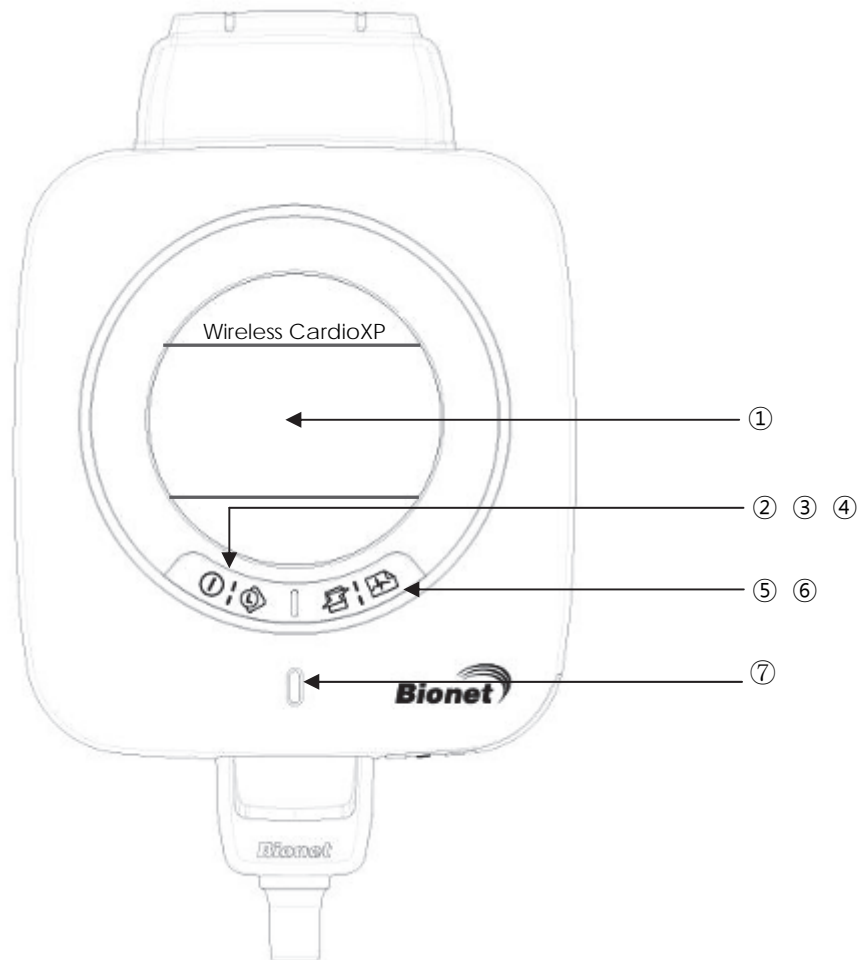
Patient Cable Socket: It's to put the 11 pin patient's cable

■ Lower View



Data Cable Socket: To pit the 8 pin data cable
Wireless Pack Socket: To put the wireless pack

■ Front View



LCD: It displays the ECG waveform, cable and wireless connection state and battery state

Power button: It's to turns on or off the patient signal module

Lead change button: It's to change the lead of waveform seen on LCD of patient signal module or close the error message box

Error Message Close Button : When the error message displays, the mode changes by it to the wave mode

Wireless connection button: It's to start wireless connection

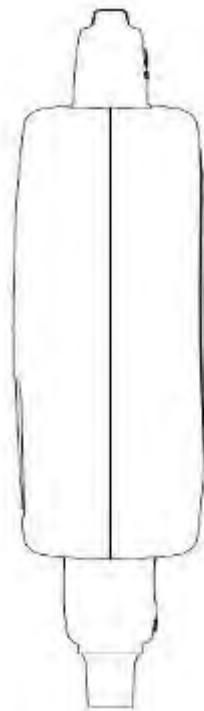
Start button: It's to start the ECG recording of the hardware from the patient signal module

LED: It shows the operation state of the patient signal module

■ Rear View



■ Left View



■ Right View



WARNING

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Only an authorized person can disassemble the product.

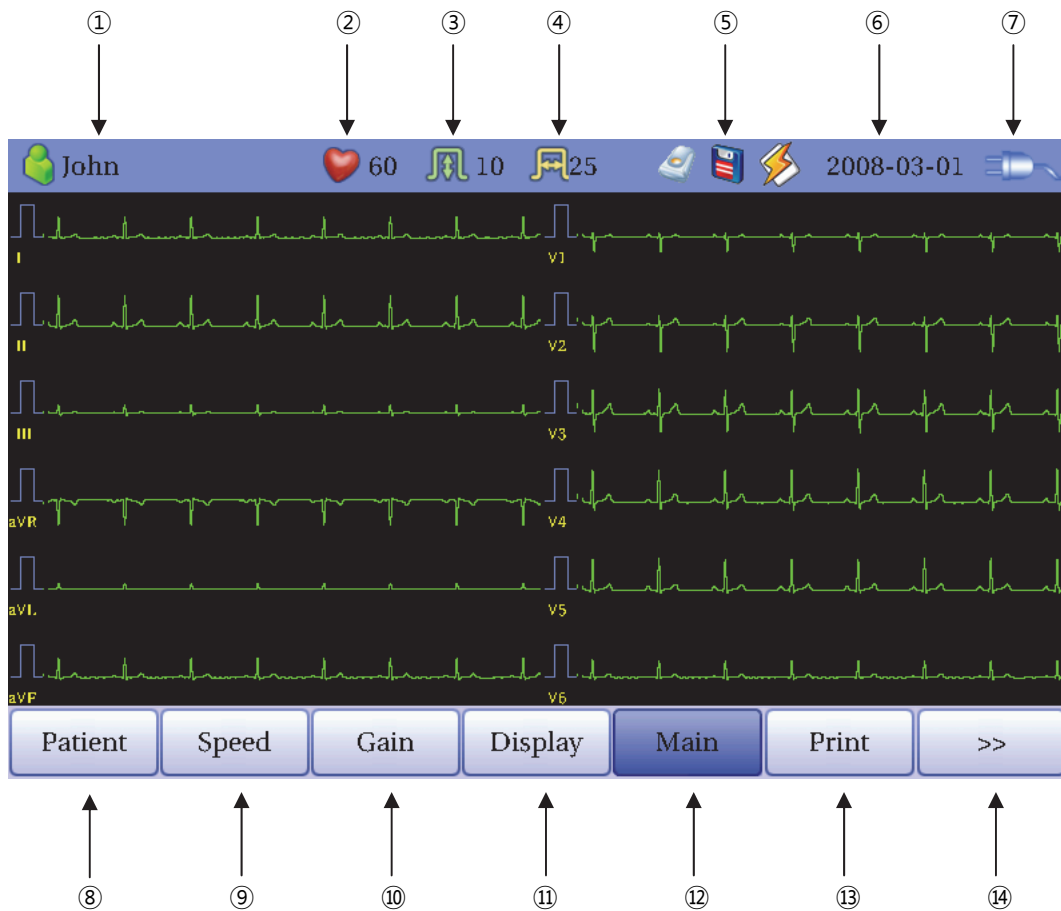
Graphic display LCD

The front part consists of the graphic display LCD which shows the operation state of the product, power switch, LED which shows the power and battery state and the control unit (Key & Rotary switch).

The ECG basic page of the graphic display LCD show the information saved, heart rate (HR) and the waveform of the chosen lead group. When inputting information, the information page will be shown.

CardioXP Operation Manual

The following is the explanation of the contents shown on the graphic display LCD.



Patient's ID

Patient's Heart beats

Printing speed

ECG signal size

Connection status of external device

Current date

Battery or AC power connection

Menu button for inputting patient's information

Menu button to set the printing speed of the ECG waveform

Menu button to set the signal size of the ECG waveform

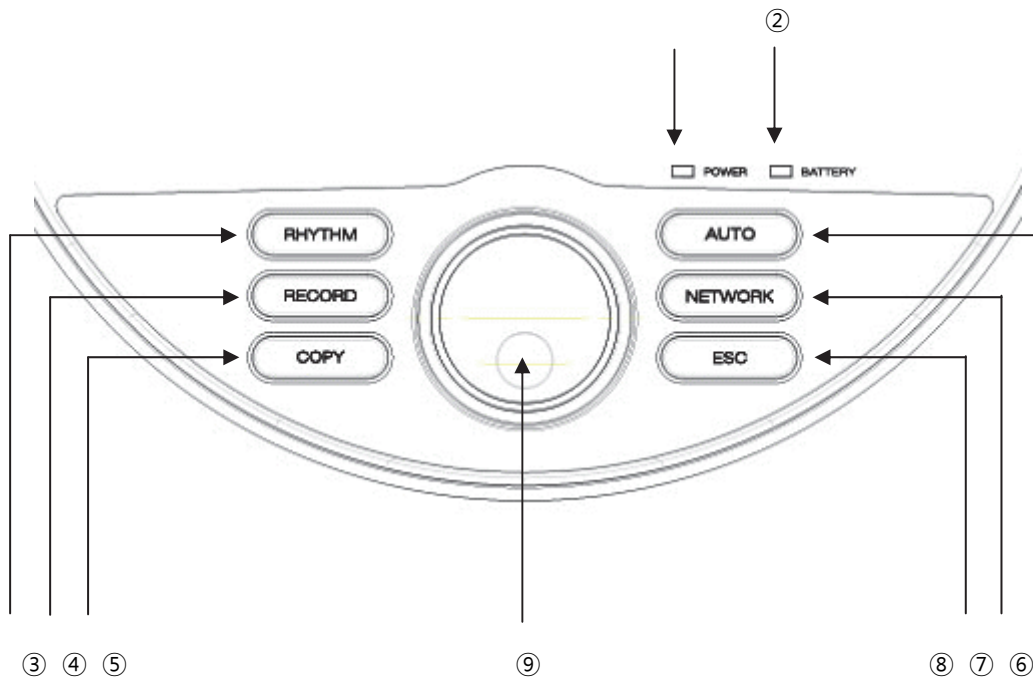
Menu button to set the page of the graphic display LCD

Menu button to move to other screen from the ECG screen

Menu button to set the printing form

Menu button to select the other menus

Control panel



Power LED: It shows the state of AC Power supply. (A green LED will be lighting when AC Power is on.)

Battery LED: It shows the battery state. (When the battery is charged, a red LED will be lighting, while the battery is full, a green light will be ON.)

RHYTHM button: It prints out the ECG waveform consistently on the A4 paper.

RECORD button: It prints out the data with a selected form after saving the 10-second or 60-second data.

COPY button: It prints out the previously saved 10-second data after processing the signal with the same or modified information.

AUTO button: It operates the product in the most frequently used operation from the ECG diagnosis test to data saving.

NETWORK button: It transfers the test data, or saved data to the server PC.

ESC button: It's to cancel the operation, or skip to the previous mode.

Rotary switch: It's used in moving or selecting the menu. (The touch screen carries out the same functions.)

4) System Installation

● Precautions for installation

Precautions before use

- Install the product in a dry environment with the 10 ~ 40°C of temperature and 30 ~ 85% of humidity.
- Please use the consent away from other appliances which make noise (cooling or heating appliances with large monitor).
- Recording paper installation: Pull the handle of the printer located at the front part of the product. When the printer is open, place papers upward and close the printer cover while pushing the handle.
- Connect the AC power cord to the socket on the rear of the product. Please make sure it is connected properly.
- Connecting Patient Cable: Connect the patient cable to the socket on the rear of the product. Plug the limbs electrode into the terminals of Patient Cable RL(N), LL(F), RA(R), LA(L) and the chest electrode into the terminals of V1(C1), V2(C2), V3(C3), V4(C4), V5(C5), V6(C6).

Operation instructions

- Pressing the power button on the front of the product during 2 Seconds to turn on the product.
- Connect the electrode to the patient cable and attach to the patient's body.
- Check whether the electrodes are attached properly.
- Select the operation mode and follow the instructions.
- After measuring, remove the electrodes from the patient's body and turn off the machine. Pull the power supply cord off.

Storage and Management

- Turn off the machine and pull the power supply cord off.
- Remove the electrodes and cable from the patient.
- Clean the product and the accessories to avoid improper operation.
- Please throw the disposable electrode away at the designated place.

● Special attention for use

Installation and storage

- Do not place the product in a moist, hot or ill-ventilated place. Avoid dust, salt, sulfur or direct sunlight.
- Avoid vibration or mechanical shock.
- Do not place the product where there is a chemical substance or gas leaking.
- The product has to be connected to the plug endurable to proper power consumption and frequency.

Before use

- Make sure the product is earthed correctly.
- Connect every cord correctly and safely.
- Please make the charge for at least 4 hours when using the charger (optional).
- Double check the parts which connect to the patient's body.

During operation

- Connect the electrode to the patient properly.
- Make sure the metal part does not touch the patient. Do not touch the patient and the product at the same time.
- If there is any problem, turn the machine off and pull the power supply cord off.

After use

- Turn the machine off and pull the power supply cord off.
- Remove the cable and electrodes from the patient.
- Clean the product and the accessories to avoid improper operation.
- Please throw the disposable electrode away at the designated place.

Regular check-up

- Rub the product with gauze with alcohol about once a month to clean the product as well as the electrodes. Do not use lacquer, thinner, ethylene or oxide.
- Make sure there is no dust or dirt on the cable and clean it with wet gauze (40°C/104°F) after use and clean it with clinical alcohol once a week.
- This product requires a regular check-up once a year
- Refer to any servicing to qualified service personnel.

Connecting power supply

AC power

When AC power is connected, there is a green light in the Power LED of the front of the product, while when the battery is inserted, the mode will be converted into auto mode.

Battery power

When using the product without the AC power supply, the power will be supplied by the battery. When the battery is low, a message will show on the upper right part of the graphic display screen

When the battery is low (under 9.5V), warning bell will ring through the speaker and a Battery Low message will be shown on the LCD screen. You need to connect the AC power supply, because it will be turned off automatically.

- Charging time: maximum 8 hours
- Consistent Using time: over 1 hour (300 ECG printouts)

Battery replacement

When replacing the battery, the type of battery should be as below.

- Type: SDI1865L240 3S2PMXZ, Lithium Ion Rechargeable Battery Pack (11.1V/4800mA)
- Time: When the product is connected with the power supply, the battery will be charged automatically. The battery can be charged more than about 500 times. When the product is not working for more than 20 minutes, please replace the battery. Also, if the battery is damaged or makes liquid, please replace it immediately. Do not insert damaged battery into the product.

Caution

For environmental protection, do not dispose the battery improperly, but contact the biomedical engineering department of hospitals for the information.

Connecting patient signal module

Connecting wire mode

Connect 11 Pin patient cable to the patient signal module first, and then connect the 8 Pin equipment cable. Plug the other end of the 8 Pin equipment cable into the hardware.


- **Power ON/OFF**

The patient signal module is automatically operated when the machine is on. In other words, if you turn on the machine, the patient signal module is also turned on or vice versa.

- **Check cable connection**

-  : Wire Connection
-  : Wireless Connection

- **Change the lead of waveform seen on LCD**

To change the lead of waveform seen on LCD of patient signal module, press the  button. The lead will go 'II → III → aVR → aVL → aVF → V1 → V2 → V3 → V4 → V5 → V6 → I' consecutively. Default is set as 'II'.

- **Measure and diagnosis**

You can start various modes for measuring or diagnosis by using the control panel.

After checking the cable connected properly, press the  button for more than 1 second, then the 'RECORD' operation will begin.

Connecting wireless mode

Connect only 11 Pin patient cable to the patient signal module. When using wireless module, 8 Pin equipment cable is not necessary, unless the wireless pack needs to be charged.



Also, please make sure the wireless pack is connected to the patient signal module correctly. When the wireless pack is not connected or is not connected properly, the wireless mode will not work.

Caution

Hereby, Bionet declares that this CardioXP is in compliance with the essential requirements and other Relevant provisions of directive 1999/5/EC.

- **Power ON/OFF**


Regardless the state of the hardware, the patient signal module can operate.



- Power ON: Press the  button for 2 seconds when the module is off
- Power OFF: Press the  button for 2 seconds when the module is on

When using the wireless mode, if the patient signal module does not operate for about 5 minutes, that is, when the module is in 'Lead Fault'


without receiving any order from the hardware, it will be automatically turned off.

- **Check wireless connection**


After checking the module is turned on, press the  button for more than 2 seconds, it will automatically recognize the wireless pack and show the wireless icon.

-  : Connected correctly
-  : Connected improperly

Caution


If the wireless connection will break while using the patient signal module, please check the module is turned on, and press the  button for more than 2 seconds. And then you can use wireless connection again

- **Change the lead of waveform seen on LCD**

To change the lead of waveform seen on LCD of patient signal module, press the  button. The lead will go 'II → III → aVR → aVL → aVF → V1 → V2 → V3 → V4 → V5 → V6 → I' consecutively. Default is set as 'II'.

- **Measure and diagnosis**

You can start various modes for measuring or diagnosis by using the control panel.

After checking the wireless module connected properly, press the  button for more than 1 second, then the 'RECORD' operation will begin.

The patient signal module and hardware works 1:1 and when the battery level is under 1 minute, the hardware will receive a low battery message and the patient signal module will be automatically turned off.

- **Charging the battery (When installing the wireless pack)**


- * **Charge after use**





Insert the 8 Pin equipment cable into the hardware when the product is turned off. The AC power should be connected.

- * **Charge during use**

Insert the 8 Pin equipment cable into the hardware even when the product is turned on. The mode will change to the cable mode automatically.

- * **Battery charging indicator**

When the battery is low,  icon will flash and it will be turned off automatically.

-  : Charge complete
-  : Medium battery
-  : Low battery
-  : Discharged

Installing the recording paper

When pulling the printer's handle located at the front of CardioXP, a tray will come out. Place papers upward and put the tray in.

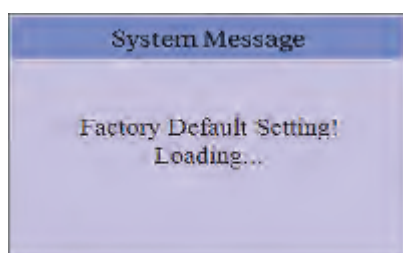
WARNING

Please use the papers provided by our company, otherwise it can impact on the diagnosis when doctors examine it due to the bad printing. The warranty does not cover the problems resulting from the use of other papers.

5) System Setting

Setting Initialization

Press the ESC key for 3 seconds if you want to initialize the system as it was at the time of purchasing. Then, the message as shown below will show up on the LCD for a second and the system will be initialized.



The initialized values are as below.

Contents	Setting Value
Sensitivity	10mm/mV
Printing Speed	25 mm/s
Rhythm Channel	II, V1, V5
Power Noise Filter	50Hz or 60Hz (depending on languages)
Low Pass Filter	150Hz
EMG Filter	Off
Base Line Filter	On
Monitoring Size	Continue
Channel Form	3 CH + 3 RHY
Display Form	6 * 2
ST Level	AUTO
Color	Background: black, Text: yellow, Gain Scale: blue, Graph: green
Monitoring Form	12 CH
Volume	High
Start Screen Option	ECG
Unit	Height : cm, Weight : kg
Auto ECG Stored	Yes
Store Location	Internal Memory
Transmit Location	PC
Analysis Level	Professional
Paper Size	A4
Beat-Form Format	Off
File Export Target	PC
File Export Method	Manual
File Export Format	EKG
File Export Delete	Yes
File Export JPEG Size	1024x768

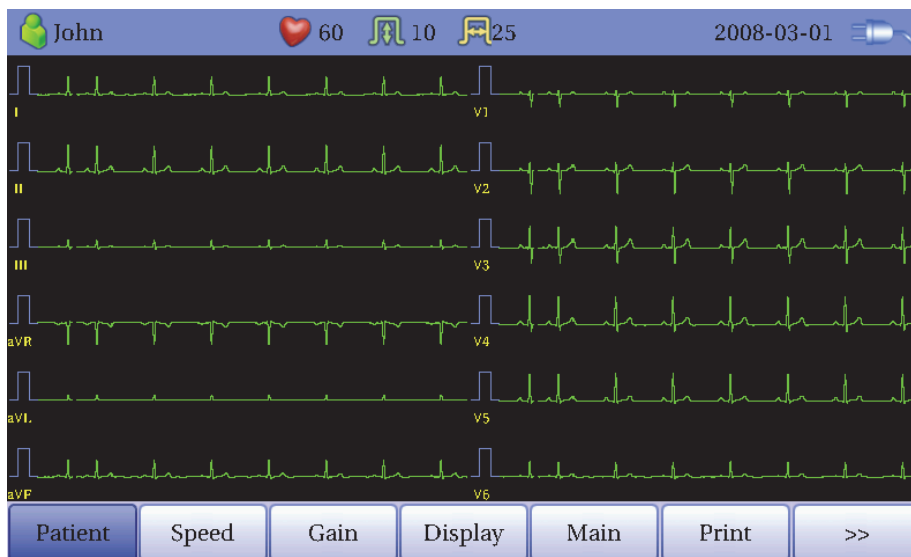
6) System Starting

When the power switch is on, after system version and the name of the company are displayed for about 5 seconds, the main page with menu items as shown below will come up.



You can move to the main page of the chosen menu by touching the menu on the screen or rotating the key on the control panel.

The following is the main page of ECG menu.



If you remember the information shown below, it will be easier for you to use the main page of ECG.

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Menu	Description
Patient	To Input or check the patient's information
Speed	To set up the speed for printing out the ECG waveform
Gain	To set up the size of the ECG waveform
Display	To set up the main page of the ECG
Main	To skip to main page of ECG File management, ECG Order management and Spirometer
Print	To set up the form of printing
>>	To skip to next page
<<	To skip to previous page
System	To set up the various contents related to the equipment
Filter	To select the filter adapted to ECG signal

The following is the main page of ECG file management, shown when selecting the 'File' menu.

The screenshot shows a window titled 'File Management' with a date of '2008-03-01'. It contains a table with the following data:

No	ID	Name	Age	Date	Type
1	KOR-123456	John Chang	39	20080301173616	ECG
2	KOR-123457	Denial Seo	38	20080225114208	ECG
3	BER-345678	Chris Oh	35	20080208132354	ECG
4	BER-345679	Irina Lukashova	28	20080124153203	ECG

At the bottom of the window, there is a control bar with buttons for '<<', '>>', 'Print', 'Info', 'Delete', 'Main', 'Setup', and 'Search'.

If you remember the information shown below, it will be easier for you to use the main page of ECG file management.

CardioXP Operation Manual

Menu	Description
<<	To skip to previous page
>>	To skip to next page
Print	To print out the chosen data
Info	To check the patient's information
Delete	To delete the chosen or all data
Main	To skip to main page of ECG, ECG Order management and Spirometer
Setup	To set up the various contents related to the equipment
Search	To search the data by inputting what you want to find

The following is the main page of ECG order management, shown when selecting the 'Order' menu.

The screenshot shows a software window titled "Order Management" with a date of "2008-03-01". The window contains a table with the following data:

No	ID	Name	Age	Date	Type
1	BER-345679	Irina Lukashova	28	20080124153203	ECG
2	BER-345678	Chris Oh	35	20080208132354	ECG
3	KOR-123457	Denial Seo	38	20080225114208	ECG
4	KOR-123456	John Chang	39	20080301173616	ECG

Below the table are several navigation buttons: <<, >>, Test, Info, Delete, Main, Setup, and Search.

If you remember the information shown below, it will be easier for you to use the main page of ECG order management.

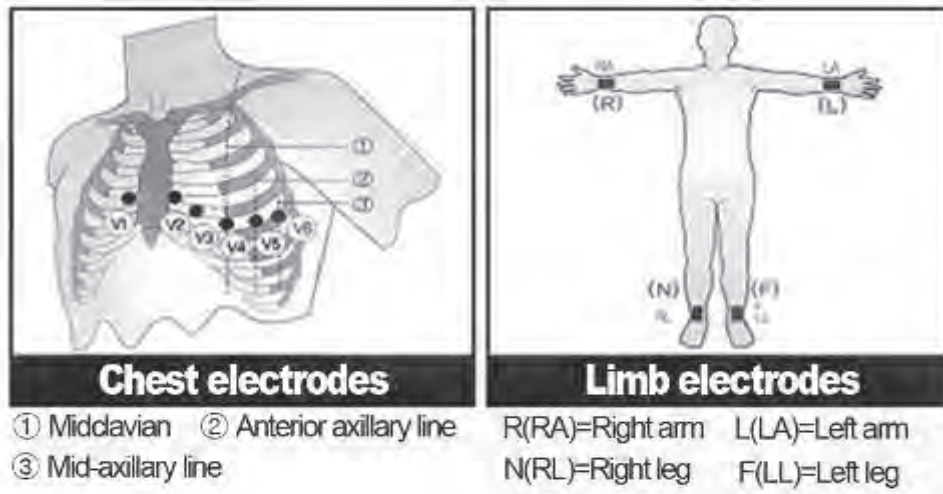
Menu	Description
<<	To skip to previous page
>>	To skip to next page
Test	To start the test with the chosen data
Info	To check the patient's information
Delete	To delete the chosen or all data
Main	To skip to main page of ECG, ECG File management and Spirometer
Setup	To set up the various contents related to the equipment
Search	To search the data by inputting what you want to find

2. ECG Recording

- 1) Location of electrodes
- 2) Connecting electrodes
 - Connecting patient cable
 - How to attach the electrodes
 - Trouble shooting for lead connection
- 3) Starting ECG recording
- 4) Basic setting
 - General information
 - Patient information
 - Printing speed setting
 - Signal gain setting
 - Display setting
 - Filter setting
 - Printing channel setting
- 5) Display form
- 6) Monitoring form
- 7) Recording form
 - 10-second ECG recording
 - 60-second ECG recording
- 8) Printing form
- 9) Copy
- 10) System setup
 - Basic Setup
 - Network Setup
 - Hospital Setup
 - Record Setup

1) Location of electrodes

In order to record standard 12 lead ECG of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5 and V6, attach electrodes to the patient's body as shown below.



The location of limbs electrodes

- RL(N): Right leg
- LL(F): Left leg
- RA(R): Right arm
- LA(L): Left arm

The location of chest electrodes

- V1(C1): 4th intercostal space at the right sternal border
- V2(C2): 4th intercostal space at the left sternal border
- V3(C3): Equidistant between V2 and V4
- V4(C4): At the midclavicular line in the 5th intercostal space
- V5(C5): At the anterior axillary line in the same horizontal plane as V4
- V6(C6): At the midaxillary line in the same horizontal plane as V4

2) Connecting electrodes

* Check it out!

- Before measuring, check the connection between the patient and the electrodes.
- Make sure there is no mechanical danger.
- Check the cable and accessories connected externally.
- Check every equipment connected to the patient's body.

Connecting patient cable

Connect the patient cable to the socket on the rear of the product. Plug the limbs electrode into the terminals of Patient Cable RL(N), LL(F), RA(R), LA(L) and the chest electrode into the terminals of V1(C1), V2(C2), V3(C3), V4(C4), V5(C5), V6(C6)

How to attach the electrodes

Lay down the patient on the bed and let the patient relaxed. Attach the electrodes cleaned with water or antiseptic alcohol to the patient's body. If it is hard to attach the electrodes due to the patient's hairs or curves of the body, apply the ECG gel. Please make sure the electrodes are attached correctly as explained above. When using the gel, please remove the gel after use as it may cause noise of the ECG signals.

WARNING

Please use the electrodes and the patient cable provided by us only. The warranty does not cover the problems resulting from the violation of this warning.

Trouble shooting for lead connection

You can see the waveform of every lead on the screen. Check the lead connection and noise of the waveform.

These are the cases in which the lead is connected improperly.

- When the lead is removed from the patient's body
 - ✓ Please attach the electrodes correctly again.

- When the conductivity between the patient's body and the electrode is weak
 - ✓ Please apply water or the ECG GEL around the electrodes and attach them to the body again.

If the signal is not clean after trying both of them, please contact our customer service center.

3) Starting ECG recording

- After connecting the lead to the patient's body, following the instructions, turn on the power switch.
- Check the setting for filter, size of signals, printing speed, channels and rhythm. Set up the new value if you want to modify them.
- Input the patient's information.
- If the waveform on the LCD is not normal or there is excessive noise, please refer to the trouble shooting for lead connection.
- If the waveform on the LCD is normal, press the 'RECORD' key to record the ECG.
- Press the 'COPY' button to print out the previously saved 10-second data or modified data.
- Press the 'RHYTHM' key to monitor the ECG waveform through the printer not through the LCD.
- Press the 'ESC' key to stop the operation while printing or recording.

If you remember the information shown below, it will be easier for you to use the product.

RHYTHM (rhythm printing)	To print out the real time signals while stopping to monitor the LCD. You can obtain the consistent rhythm or in the A4 size of paper chart.
RECORD (diagnosis printing)	After saving the 10-second data from the time of pressing the button, the parameter for diagnosis will be extracted and printed out in the A4 size of paper chart.
COPY	To print out the previously saved 10-second data after processing the signal with the same or modified information about the filter, size of signals, printing speed or channels.
AUTO (automatic printing)	To automatically operate the most frequently used mode from the ECG test to data saving.
NETWORK (data transferring)	To transfer the ECG data to the PC set up with server IP.
ESC (stop)	Used to cancel the operation order, to move to the previous mode when inputting main menu or to stop printing.

4) Basic Setting

General Information

When the system begins, the LCD shows the patient's information, heart beats, printing speed, size of the ECG signals, date and the state of the power supply, consecutively.

They can be modified in two ways.

First, you can use the rotary key to change the information.

Second, you can use the touch screen by touching the information you want to change on the screen. It is simple as it shows the mode you want to see with just one-touch.

Using the rotary key to modify the information

There are 4 steps, entering mode, skipping menu, selecting menu and information modification, when using the rotary key.

- Entering to the menu mode

The rotary key is supposed to rotate clockwise. When the user selects the ECG Main, the initial focus will point to the 'patient' item.

The following is the page you will see when you rotate the key clockwise and click it to enter to the speed menu.



- Menu Skipping

Please use the rotary key. The direction of the menu skipping is identical with the direction of the rotary key rotation.

- Menu Selecting

Please use the rotary key. It will show the menu box of the chosen menu.

- Information modification

Skip to the chosen item by using the same method when you do for menu skipping and modify the information by clicking the rotary key. When you select one of 12.5mm/sec, 25mm/sec or 50mm/sec at the 'Speed Setting' POP-UP, the POP-UP window will disappear.

Using the touch screen to modify the information

When using the touch screen, only two procedures, menu selecting and information modification, are required.

- Menu Selecting

Press the menu on the screen. Unlike the rotary key, the menu box you want to set up will show at the same time.

- Information modification

Press the chosen item on the screen after moving to the page.

Patient information [Patient]

The user can input the patient's ID, name, age, gender, height and weight.



When the user selects the line of ID, NAME, Department or Room Number, a keyboard will show up in the screen. The default of every line is a blank and if there is a certain figure on the line, it should be shown exactly when loading the keyboard window.

When the user wants to set the data after inputting, the user can press OK button on the keyboard and if the user wants to cancel the setting, pressing ESC button will do it and the keyboard window will disappear.



When the user selects the line of Age, Birth, Height or Weight, a keypad will show up in the screen. The default of every line is a blank and if there is a certain figure on the line, it should be shown exactly when loading the keypad window.

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In case of a baby under 1 year old, input his/her age by weeks or days.

When the user wants to set the data after inputting, the user can press OK button on the keypad and if the user wants to cancel the setting, pressing ESC button will do it and the keypad window will disappear.



When clicking the Gender Line, the letter Male or Female will be shown respectively. After selecting the data which you want to, input all the information of the patient. When pressing OK button, the information will be saved, while pressing cancel button will cancel the setting. The default of the Gender line will be set as a blank.



When clicking the Race Line, the letter Oriental, White or Black will show up. After selecting the data which you want to, input all the information of the patient. When pressing OK button, the information will be saved, while pressing cancel button will cancel the setting. The default of the Race line will be set as a blank.

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John 59 10 25 2008-03-01

Patient Information

ID: 123456789ABC
Name: John
Age: 40 years
Gender: Male
Height: 175 cm
Weight: 65 kg
Smoke: Yes|1/2/12|
Department: HIC
Room No: 6
Race: Oriental

OK Cancel New

Patient Speed Gain Display Main Print >>

When clicking the Smoke Line, a Smoke Setting window will show up as shown below. After input the data, when pressing OK button, the information will be saved, while pressing cancel button will cancel the setting.

If you are a smoker, choose the year and input the period of smoking on the keypad then press the OK button. The default of the Smoke line will be set as a blank.

John 59 10 25 2008-03-01

Patient Information

ID: 123456789ABC
Name: John
Age: 40 years
Gender: Male
Height: 175 cm
Weight: 65 kg
Smoke: No
Department: No
Room No: 6
Race: Oriental

OK Cancel New

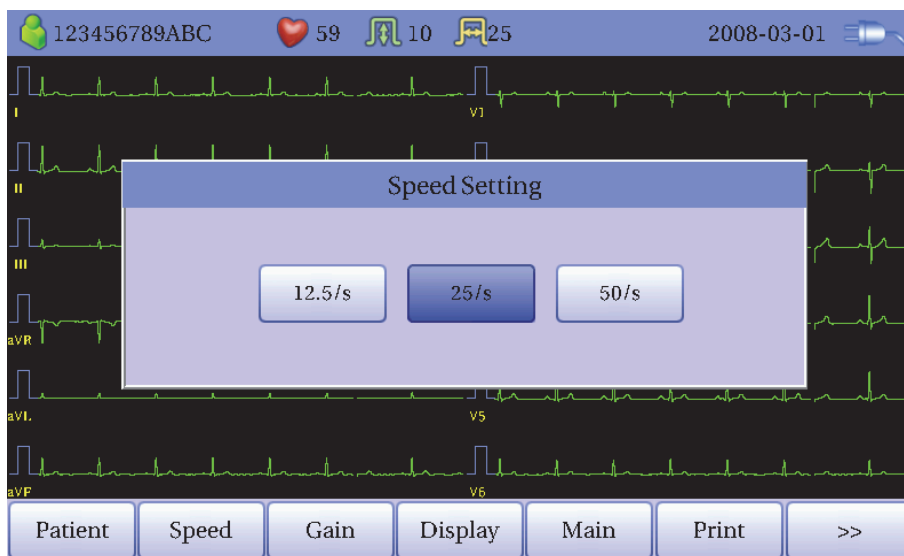
Patient Speed Gain Display Main Print >>

When you completed inputting all information, you will see the window as shown below. After checking all information, when pressing OK button, the information will be saved, while pressing cancel button will cancel the setting.

When pressing the 'New' button, all of the information will be initialized.

Printing speed setting [speed]

This is a function to adjust the width of the printing signal. The values are available in 12.5mm/sec, 25mm/sec and 50mm/sec. If you set 25mm/sec up, the ECG signal will be recorded in 25mm for one second. Thus, the width of 12.5mm/sec is half of the width of 25mm/sec and that of 50mm/sec is twice as much as that of 25mm/sec. Therefore, if you want to have a wide signal, set up the bigger value.



In order to adjust the speed of the ECG waveform, press the rotary key at the 'Speed' menu, then the mode will change to the information modification mode. Then, you can select the speed you want by clicking the rotary key.

The set value will be displayed the upper part of the graphic display screen and also will be displayed at the bottom of the report as 12.5mm/sec, 25mm/sec or 50mm/sec.

If you want to print out it in A4 paper, please set the value of 25mm/sec.

Speed setting will operate differently according to the monitoring form or recording form. For the monitoring form, ECG waveform and the printing speed are generated as they are set up, whereas in recording form, ECG waveform is generated as it is set up, but the printing speed is 50mm/sec in order to make the process faster when printing the paper.

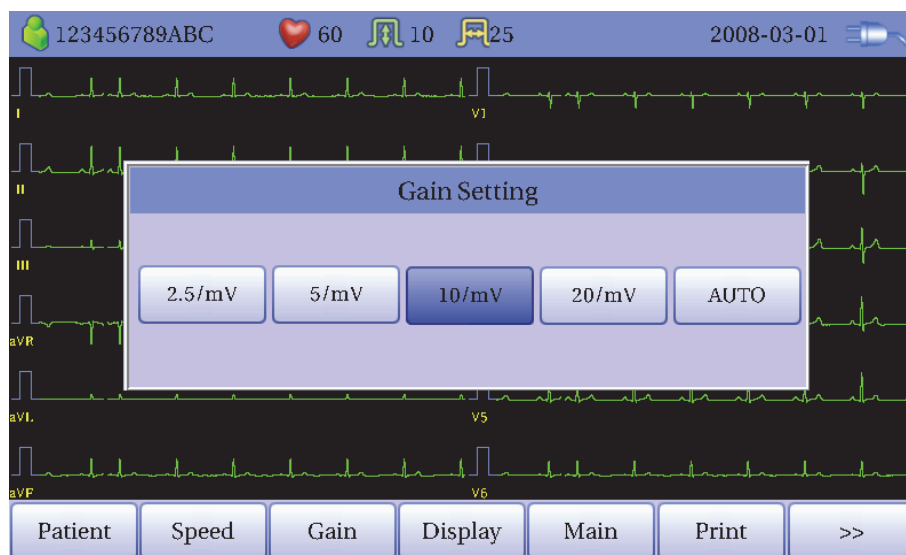
Signal gain setting [Gain]

This is the function to adjust the size of signals when the signal is overlapped with neighboring signal because it is too big, or when it is hard to interpret the signal because it is too small.

The user can adjust the value by setting up the 12 leads into 2.5mm/mV, 5mm/mV, 10mm/mV and 20mm/mV, the limbs lead (I, II, III, aVR, aVL, aVF) into

10 mm/mV and the chest lead (V1, V2, V3, V4, V5, V6) into 5mm/mV. All of them can be done automatically.

'10mm/mV' means that the signal with 1mV will be printed out in the size of 10mm.



By using the rotary key or the touch screen, press the 'Gain' menu to open the 'Gain Setting' window. In the same way, you can set up the size of the signal.

The set values are displayed the upper part of the graphic display screen and also are displayed at the bottom of the report as follows. When 2.5, 5, 10 or 20 is selected, All Channels: 2.5mm/mV, All Channels: 5mm/mV, All Channels: 10mm/mV or All Channels: 20mm/mV will be displayed respectively and when the Auto mode is selected I-aVF: 10mm/mV, V1-V6: 5mm/mV will be shown.

As the name of the each channel and the size of signals can be seen from the left side of the graphic display LCD, you can easily check the modification. In case of 20mm/mV, only one bar graph is supposed to be shown in order to avoid the overlap.

Display setting [Display]

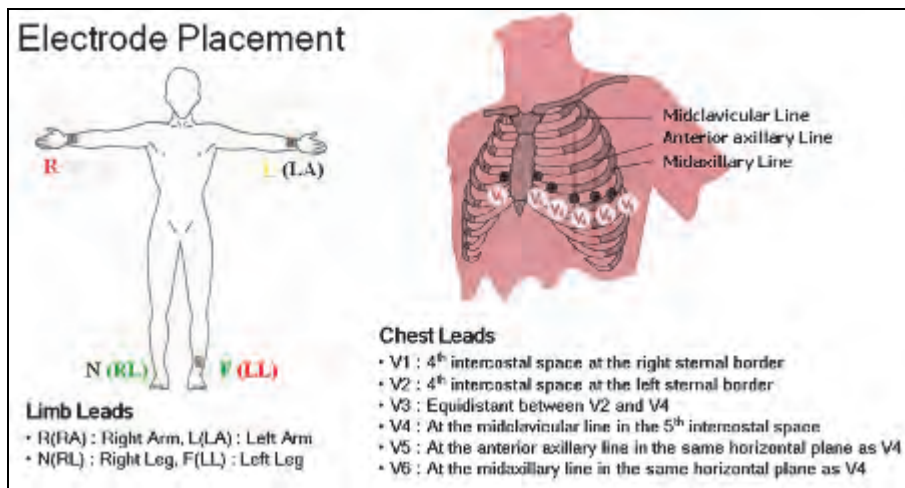
This is a menu to set up the display of the main page of ECG. By using the rotary key or the touch screen, press the 'Display' menu to open the 'Display Setup' window.

'Form' menu is to set up the printing form of the ECG waveform. When you click the menu, '6 X 2' will be set up and when clicking the menu again, '3 X 4' will be set up. Default is set as '6 X 2'.

- '3 X 4': Display with 3 channels at the same time (I ~ III / aVR ~ aVF / V1 ~ V3 / V4 ~ V6)
- '6 X 2': Display with 6 channels at the same time (I ~ aVF / V1 ~ V6)



'Leads Place' menu shows the electrodes connection. When clicking the 'Leads Place', you will see a page shown below. If you click the rotary or 'ESC' key again, the 'Display Setup' window will show up again.



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- 'Text': The style of the 'MENU' button is to set up the below 'TEXT' form.



- 'Icon': The style of the 'MENU' button is to set up the below 'ICON' form.



In 'Grid' menu, ECG waveforms would look like that of ECG paper printout. When 'Grid' menu is highlighted, touching the button will switch indicator to 'Grid On' and activate 'Grid' view. Touching the button again will switch to 'Grid Off' and deactivate the view. 'Grid' is set to 'On' by default



Turning on the 'Grid' option will make the ECG screen look like ECG paper printout.

'Color setting' menu is used to adjust the color on the screen.

Default is set as 'Back': black, 'Text': yellow, 'Cal Line': blue and 'Graph': green.



- 'Back': ECG waveform's background color
- 'Text': Each lead of ECG waveform's text color
- 'Graph': ECG waveform's color
- 'Cal Line': ECG waveform's size color

When selecting the 'Color Setting' menu, you will see a palette as shown below. Choose the color you want by using a rotary key or the touch screen.

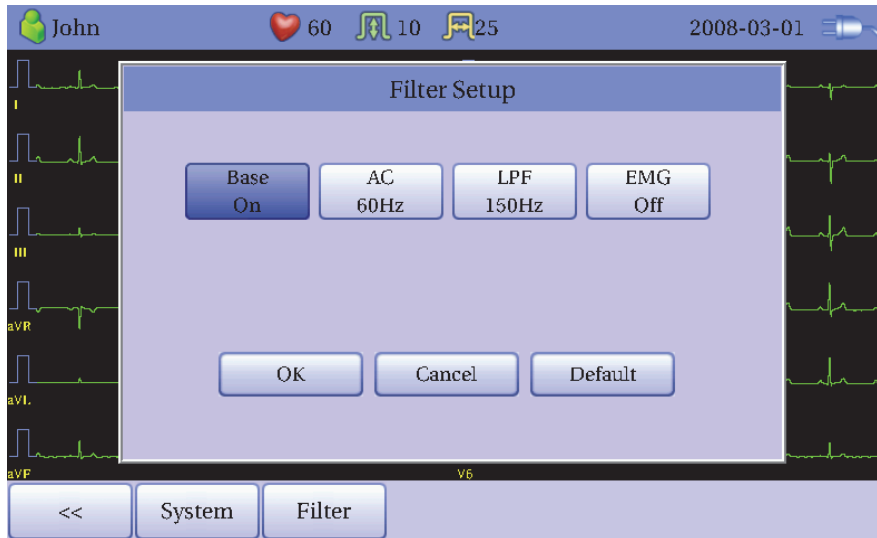


After changing the setting at the 'Display Setup' window, press 'OK' to save the new information or 'Cancel' to cancel the information.

If you click the 'Default' button, all of the information will be initialized.

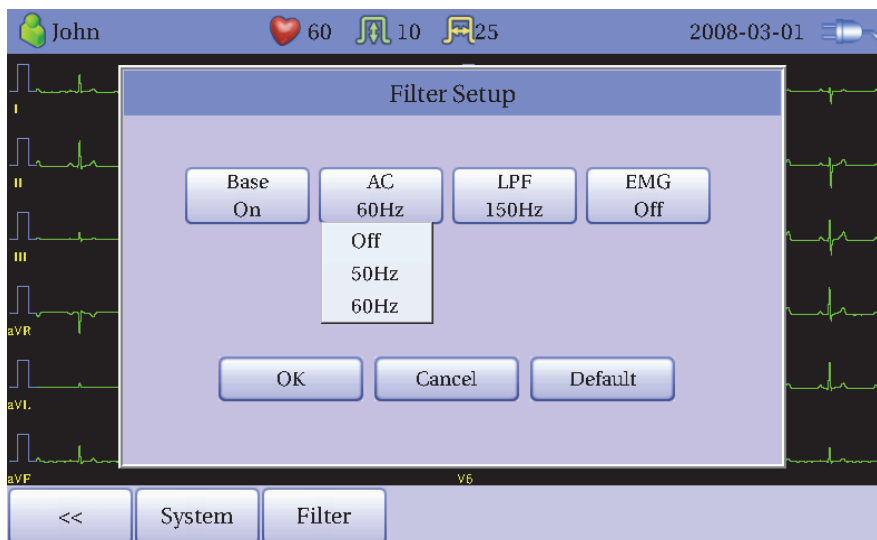
Filter setting [Filter]

In addition to the ECG signals, the information such as noise, Base Line Drift of breathing or EMG signals can be recorded too. Base Line Drift is a noise created by the patient's breathing and a phenomenon in which ECG is adapted to a huge parabola. When applying the BASE LINE filter, select 'ON', otherwise select 'OFF'. If it is on, the value will be displayed at the bottom of the printing form as '0.1Hz-' and if it is off, '0Hz-' will be the value.



After selecting the 'Filter' menu at the main page of ECG, rotate the rotary key to go to 'Base' menu, and then click it to make it ON or if you click it again, it will be OFF. The filters to reduce the noise are available in 50Hz, 60Hz or OFF, and OFF means that it will not reduce the noise. In case of '50Hz', 50Hz of noise will be removed and in case of '60Hz', 60Hz of noise will be removed. Please use 50Hz where the noise is 50Hz in Europe or China and it is recommended to use 60Hz in Korea or the U.S.A.

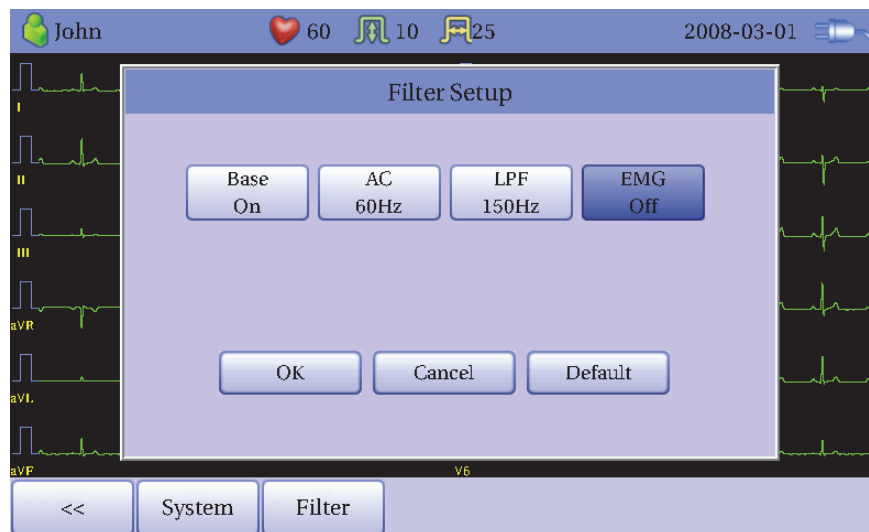
As the noise is hardly found when using the battery power, you can record the clean ECG when it is OFF.



When you select 'AC' menu at the 'Filter Setup' page, you will see a small POP-UP menu, and it will disappear when selecting OFF, 50[Hz] or 60[Hz].

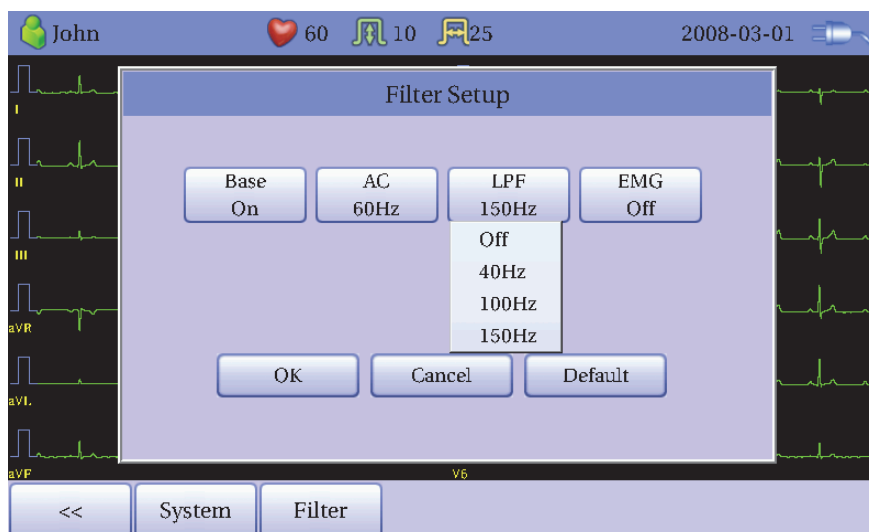
The state of the filter using will be displayed at the bottom of the printing form as 'AC 60Hz', 'AC 50Hz' or 'AC Off'.

EMG is a signal created in the muscle of the organs of the patient. It is recommended to remove it, because ECG is not recorded clearly if the patient has a number of EMG signals. When adapting the MUSCLE filter, it should be 'ON', otherwise, it is OFF and the EMG will be displayed at the bottom of the printing form. When selecting EMG menu, click it to make it ON or if you click it again, it will be OFF.



If the ECG is not clear despite adapting the three filters, you can use a low frequency filter. The low frequency filter can offer 40Hz, 100Hz, 150Hz or OFF, and '40Hz' means that it will remove every signal with 40Hz or above.

When it is OFF, it will be displayed at the bottom of the printing form as '-250Hz', 40Hz for '-40Hz', 100Hz for '-100Hz' and 150Hz for '-150Hz'.



When selecting 'LPF' menu at the 'Filter Setup' page, you will see a small POP-UP menu, and it will disappear when selecting OFF, 40Hz, 100Hz or 150Hz.

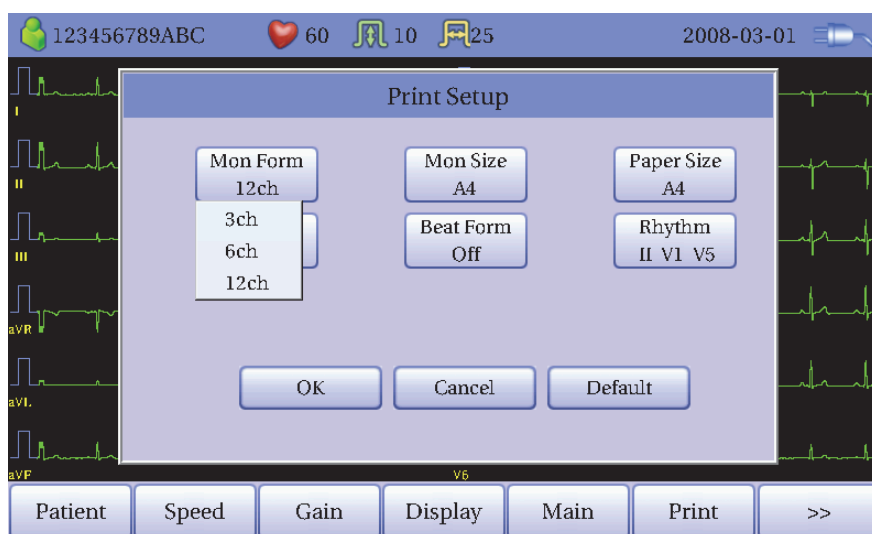
Adapting a filter can distort the original signals. Therefore, use the filter only when the signals cannot be seen correctly. It is recommended to always use the Base Line Drift filter and AC and to use the EMG filter when necessary. Also, when printing the recording from, it is better to have LPF with 150Hz.

After setting up the information you want at the 'Filter Setup' menu, press 'OK' to save the information or 'Cancel' to cancel it.

Printing channel setting [Print Setup]

[Monitoring Form]

You can set up the real time printing form. When selecting 'Print' menu at the ECG Main page and rotating the key once, the focus will go to 'Mon Form' button. Click the button then, you will see a POP-UP window. Default is set as '12CH'.

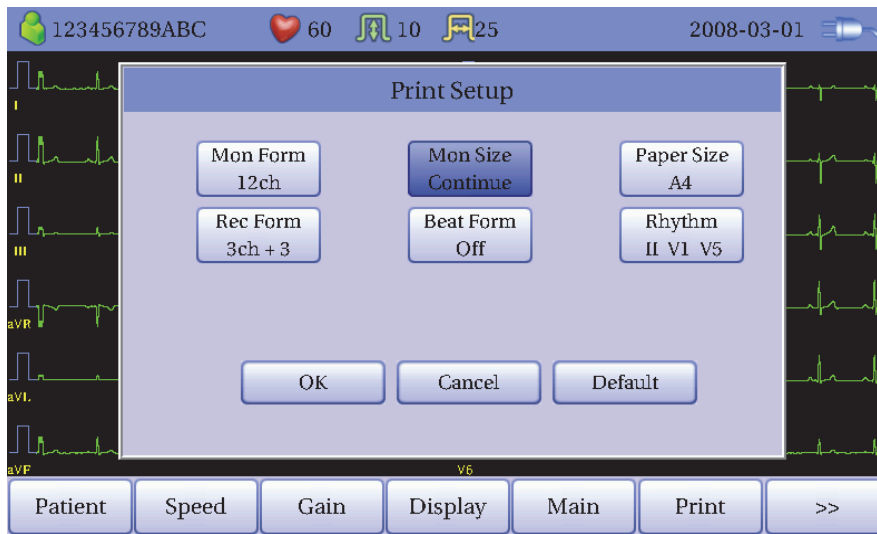


- 3CH printing: To print 3 channels at the same time (I ~ III / aVR ~ aVF / V1 ~ V3 / V4 ~ V6) If you want to change the channel, press the 'RHYTHM' on the control panel.

- 6CH printing: To print 6 channels at the same time (I ~ aVF / V1 ~ V6) If you want to change the channel, press the 'RHYTHM' on the control panel.

- 12CH printing: To print 12 channels at the same time (I ~ V6)

[Monitoring Size]



You can set up the real time printing size. When you click the 'Mon Size' menu, 'A4' will be selected and when clicking it again, 'Continue' will be selected. Default is set as 'Continue'.

- 'A4': To print out the 10-second data in the form of A4 paper.
- 'Continue': The lead will be printed out continuously until you press the 'ESC' key on the control panel.

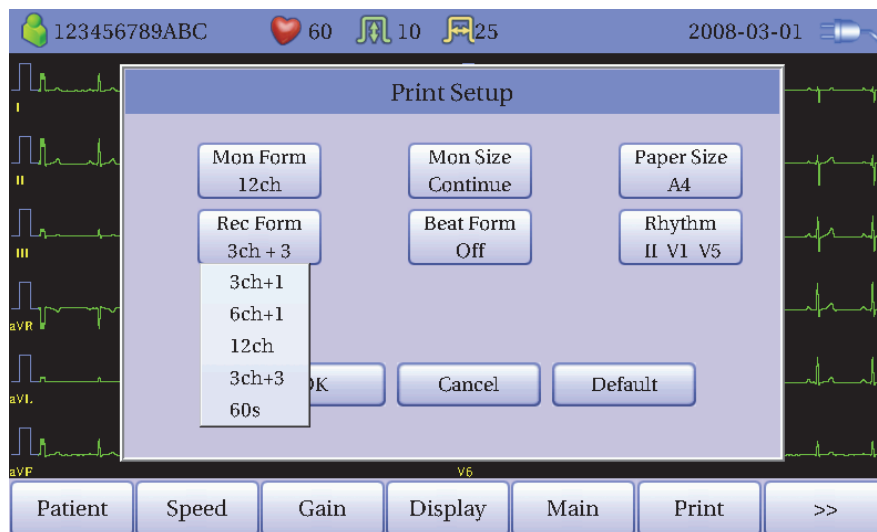
[Paper Size]

You can set up the paper size. When you click the 'Paper Size' menu, 'A4' will be selected and when clicking it again, 'Letter' will be selected. Default is set as 'A4'. Please set the paper size properly, otherwise the paper can cut wrong.

- 'A4': To use the 'A4' size paper.
- 'Letter': To use the 'Letter' size paper.

[Recording Form]

You can set up the recording form.



When selecting Print menu and 'Rec Form' menu at the main page, you will see a small POP-UP menu at the bottom of the page. The pop-up menu will disappear, when selecting 3CH +1, 6CH +1, 12CH or 3CH +3, 60. Default is set as '3CH+3'.

- '3CH+1': 10-second ECG will be recorded as I, II and III for the first 2.5 seconds, aVR, aVL and aVF for the next 2.5 seconds, V1, V2, V3 for the next 2.5 seconds and V4, V5, V6 for the next 2.5 seconds. 1 channel of rhythm will be recorded for 10 seconds at the bottom.

- '6CH+1': 10-second ECG will be recorded as I, II, III, aVR, aVL and aVF for the first 5 seconds and V1, V2, V3, V4, V5 and V6 for the next 5 seconds. 1 channel of rhythm will be recorded for 10 seconds at the bottom.

- '12CH': 12-channel rhythm will be recorded as I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5 and V6 at the same time for 10 seconds.

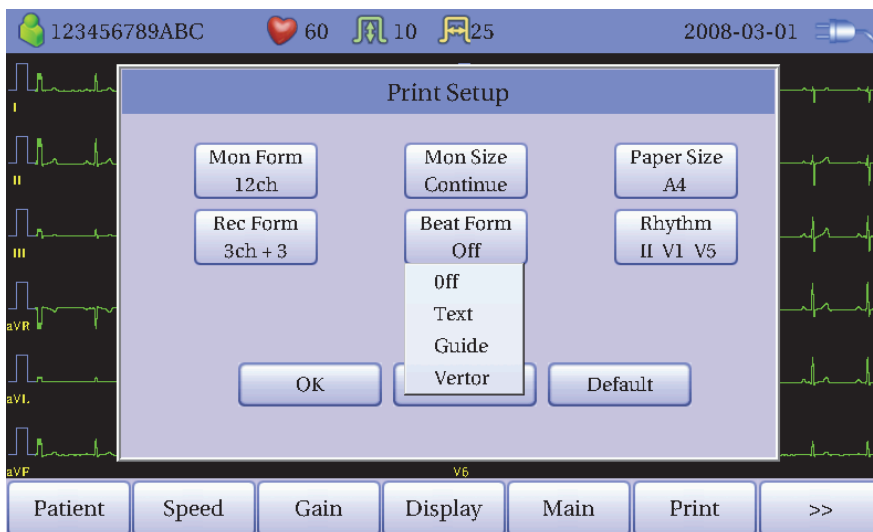
- '3CH+3': 10-second ECG will be recorded as I, II and III for the first 2.5 seconds, aVR, aVL and aVF for the next 2.5 seconds, V1, V2, V3 for the next 2.5 seconds and V4, V5, V6 for the next 2.5 seconds. 3 channels of rhythm will be recorded for 10 seconds at the bottom.

- '60sec': The chosen rhythm lead will be recorded for 10 seconds for each line. So it will take 60 seconds as there are 6 lines.

The set value will be displayed on the screen, and when you choose '3CH+1', 3 Channels + 1 Rhythm Report will be shown at the top of the printing form, '6CH+1' for 6 Channels + 1 Rhythm Report, '12CH' for 12 Channels Rhythm Report, '3CH+3' for 3 Channels + 3 Rhythm Report and '60sec' for 1 Rhythm Report(60sec) will be shown.

[Beat Form]

You can set up the additional beat report printing.



When you select the 'Beat Form' menu, a small POP-UP menu will appear at the bottom and it will disappear when choosing OFF, Text, Vector or Guide.

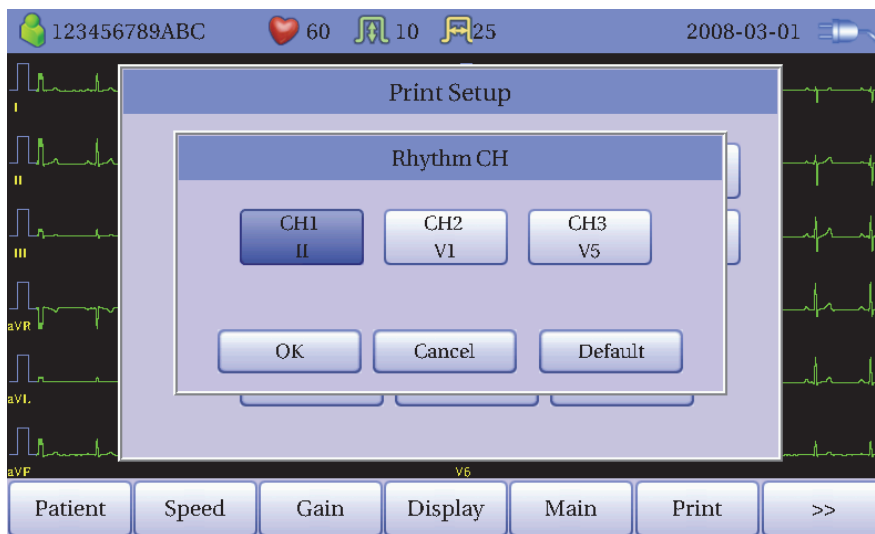
Default is set as 'OFF'.

Beat report will be attached to the printing form of channels of '3CH +1', '6CH +1', '12CH' and '3CH +3'. It will record every important result by marking the representative waveform of each form.

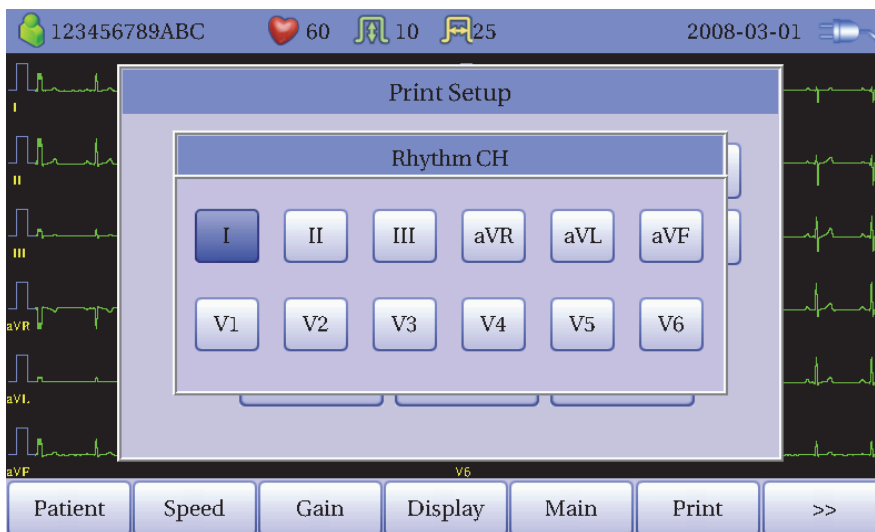
Rhythm leads setting [Rhythm]

You can set up the rhythm leads for printing out the diagnosis of 3CH+1, 6CH+1, 3CH+3 and 60sec. You can choose 3 rhythm leads and when '3CH+3' is chosen, you can use all of the 3 leads, while when '3CH+1', '6CH+1' or '60sec' is chosen, you can use the first value only.

Default is set as 'II, V1, V5', so when 3CH+1, 6CH+1 or 60sec is chosen, you can use the lead 'II' and 3CH+3 for lead 'II, V1, V5'.



When selecting the 'Rhythm' menu, you will see a 'Rhythm Channel' window as shown below. If you select the each channel menu, including 'CH1', 'CH2' or 'CH3', as below pop-up menu will show up and it will disappear when choosing one of the leads from I to V6.



5) Display Form (LCD)

You can see the real time ECG signals on the screen. This function is needed to see whether the signals from every channel are correct before recording the ECG waveform and to generate the patient's ECG for a long period of time.

The filters used for monitoring form are as below.

Base Line Filter(BASE)	ON (fixed)
Power filter (AC)	Optional
Low-Pass filter (LPF)	40Hz (fixed)
EMG filter (EMG)	OFF (fixed)

When using the monitoring form, you can set up the printing speed as 12.5mm/sec, 25mm/sec or 50mm/sec and the size of the ECG waveform as 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV or Auto.

Also, the printing form of the ECG waveform is available in '3 X 4' mode or '6 X 2' mode. The heart beat will be the average of the 4 heart beats measured previously.

6) Monitoring Form (Rhythm)

You can print out the real time ECG signals. This function is needed to see whether the signals from every channel are correct before recording the ECG waveform and to generate the patient's ECG for a long period of time.

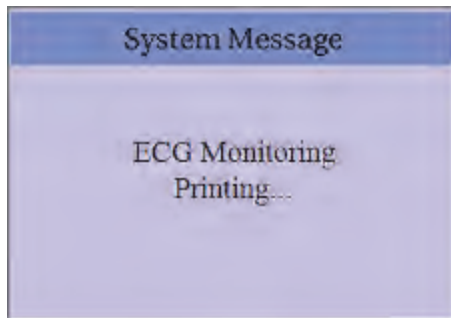
The filters used for rhythm printing are as below.

Base Line filter (BASE)	ON (fixed)
Power filter (AC)	Optional
Low-Pass filter (LPF)	40Hz (fixed)
EMG filter (EMG)	OFF (Optional)

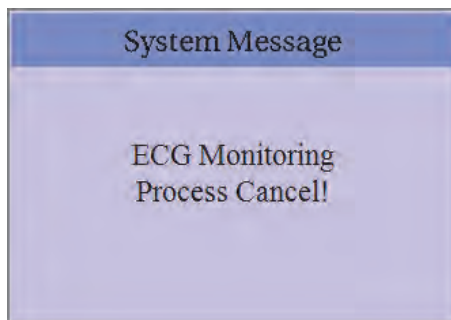
You do not need to set up the filters as they are fixed. Set up the printing speed and the size of the signals.

you can set up the printing speed as 12.5mm/sec, 25mm/sec or 50mm/sec and the size of the ECG signals as 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV or Auto.

When pressing the 'RHYTHM' key on the control panel, you will see the message as shown below and printing will start in accordance with the speed you set up.



Press the 'ESC' key to stop the printing. Then, the message will be shown for a second as below and print out the paper until dotted line and the ECG Main page will show up.

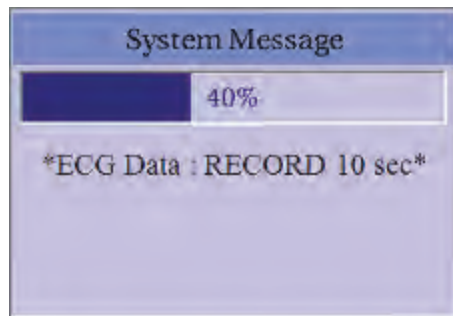


7) Recording Form (Record)

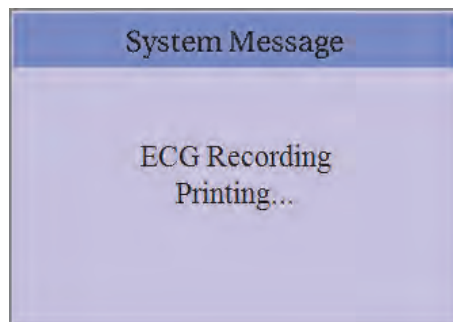
This function is used to save the ECG in the memory, to apply the filter the user chooses, to extract the parameters of heart beat, PR interval, QRS duration, QT/QTc and P-R-T Axes and to print out the results in accordance with the size of the signals, printing speed and channels selected.

10-second ECG recording

When one of 3ch+1rhy, 6ch+1rhy, 12ch or 3ch+3rhy is selected, press the 'RECORD' key on the control panel. Then it will generate the saving time as shown below and the 10-second data will be saved in the memory.

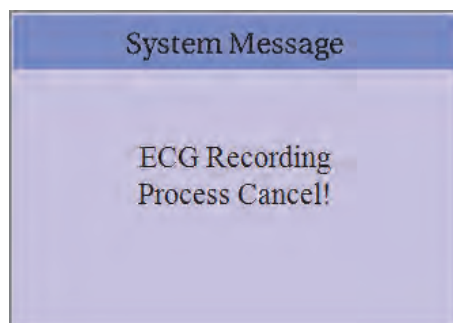


After saving the 10-second data and the parameters for diagnosis will be extracted, it will show the message as shown below and printing will begin.



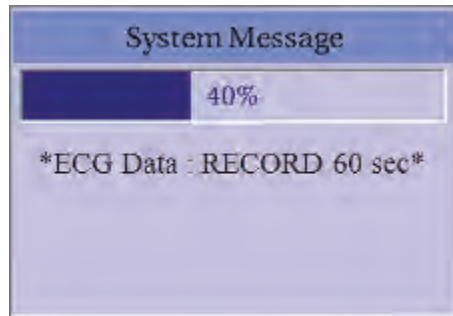
If you want to stop the process of data saving or printing, press the 'ESC' key. Then the message will be shown for a second as below.

In case of saving, the process will stop. In case of printing, print out the paper until dotted line and the ECG Main page will show up.

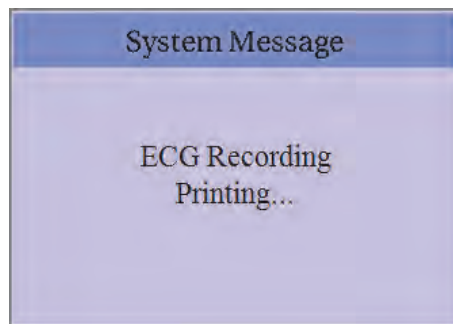


60-second ECG recording

When the channel is '60sec', press the 'RECORD' key on the control panel. Then it will generate the saving time as shown below and the 60-second data will be saved in the memory.

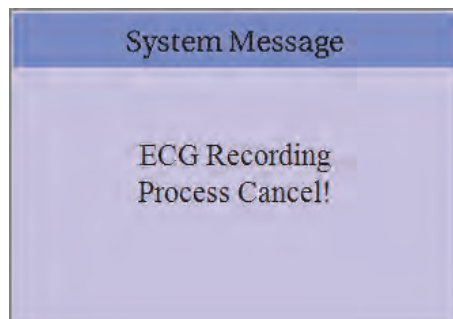


After saving the data, it will apply the chosen filter and calculate the heart beat, the message as below will show up and printing will begin.



If you want to stop the process of data saving or printing, press the 'ESC' key. Then the message will be shown for a second as below.

In case of saving, the process will stop. In case of printing, print out the paper until dotted line and the ECG Main page will show up.



8) Printing Form

The followings are the examples of the printing form as well as the explanation about each channel.

● Rhythm Printing Form

- 3CH printing: To print 3 channels at the same time (I ~ III / aVR ~ aVF / V1 ~ V3 / V4 ~ V6)
- 6CH printing: To print 6 channels at the same time (I ~ aVF / V1 ~ V6)
- 12CH printing: To print 12 channels at the same time (I ~ V6)

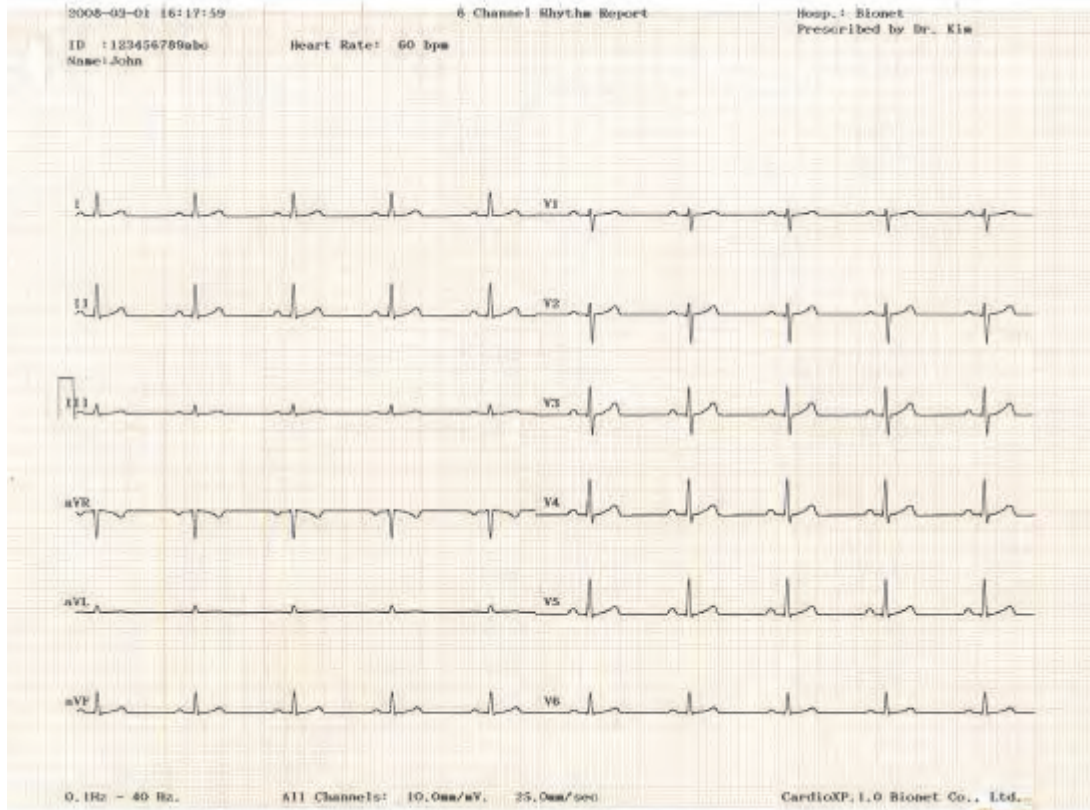
● Record Printing Form

- '3CH+1': I, II and III will be recorded for the first 2.5 seconds, aVR, aVL and aVF for the next 2.5 seconds, V1, V2, V3 for the next 2.5 seconds and V4, V5, V6 for the next 2.5 seconds. And 1 channel of rhythm will be recorded for 10 seconds at the bottom.
- '6CH+1': I, II, III, aVR, aVL and aVF will be recorded for the first 5 seconds and V1, V2, V3, V4, V5 and V6 for the next 5 seconds. And 1 channel of rhythm will be recorded for 10 seconds at the bottom.
- '12CH': 12-channel rhythm will be recorded as I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5 and V6 at the same time for 10 seconds.
- '3CH+3': I, II and III will be recorded for the first 2.5 seconds, aVR, aVL and aVF for the next 2.5 seconds, V1, V2, V3 for the next 2.5 seconds and V4, V5, V6 for the next 2.5 seconds. And 3 channels of rhythm will be recorded for 10 seconds at the bottom.
- '60sec': The chosen rhythm lead will be recorded for 10 seconds for each line. So it will take 60 seconds as there are 6 lines.

Rhythm Printing Form (3CH)



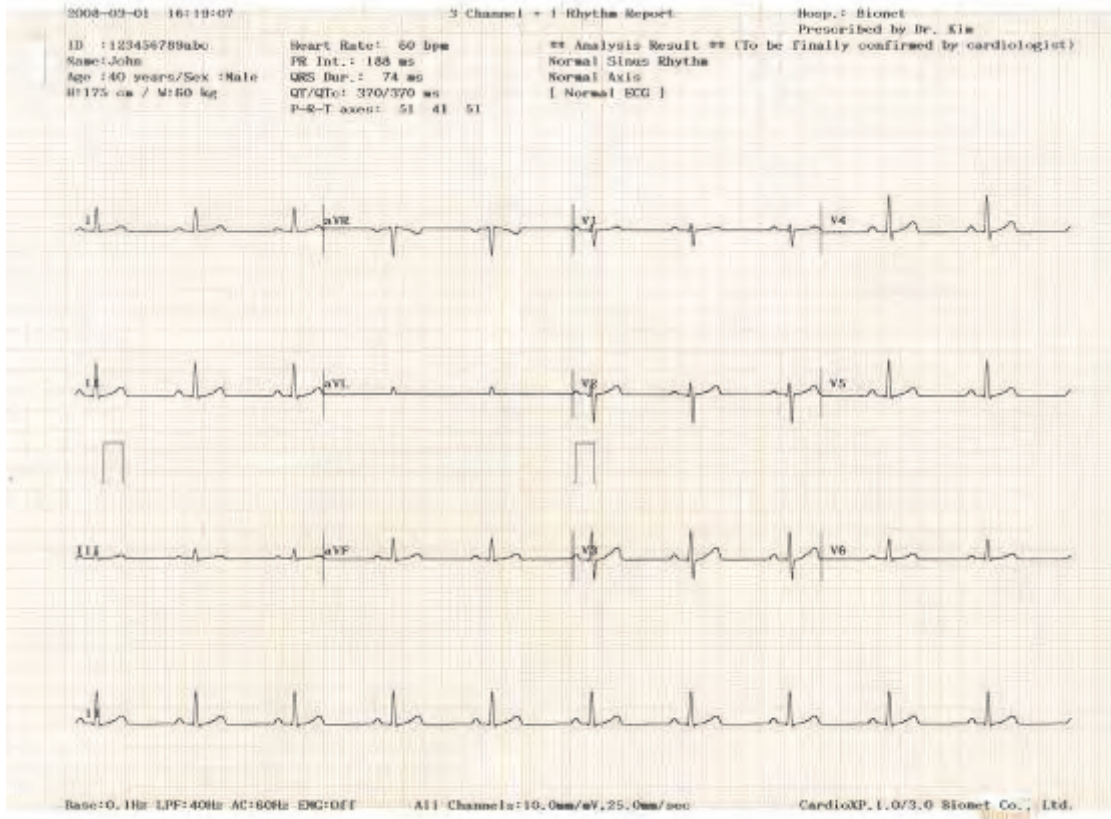
Rhythm Printing Form (6CH)



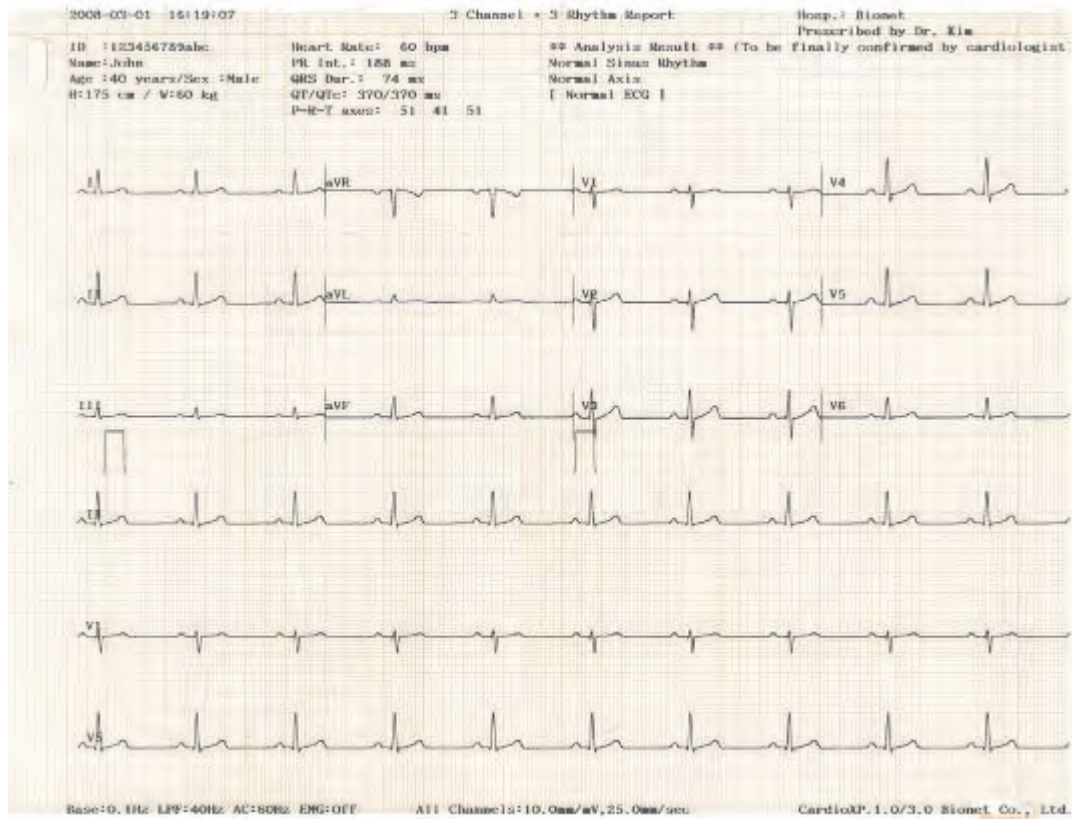
Rhythm Printing Form (12CH)



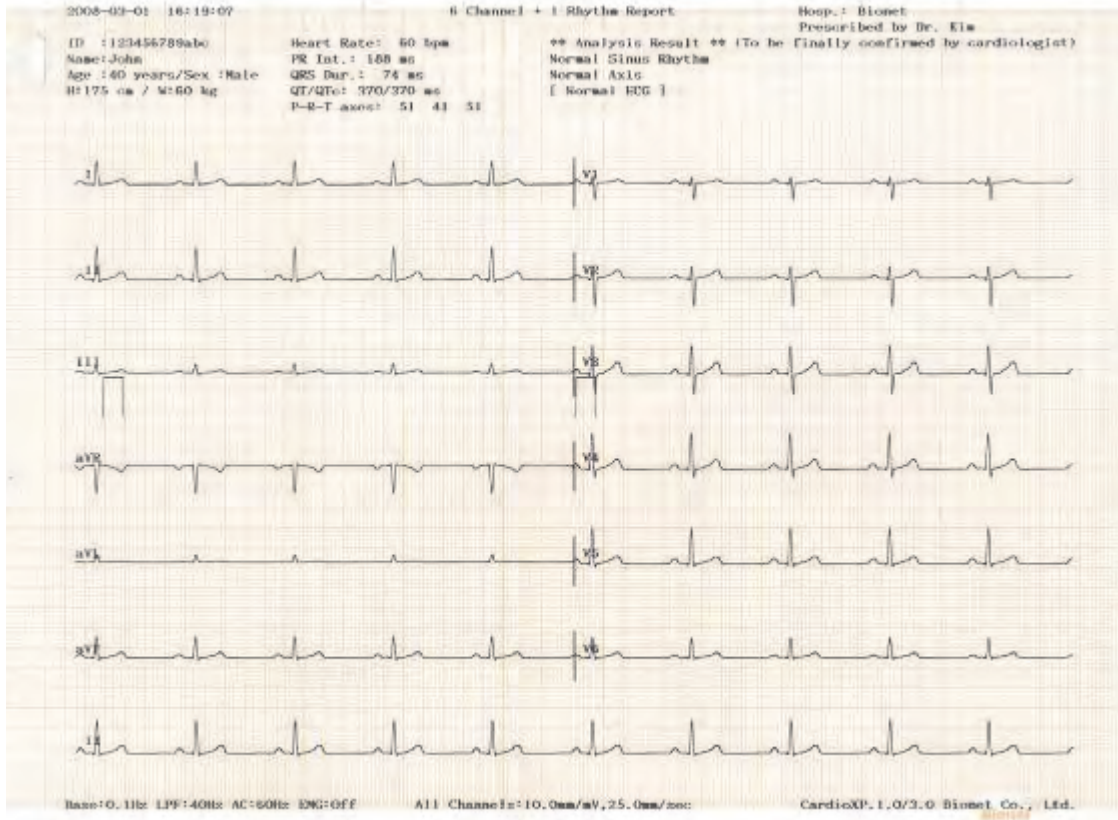
Record Printing Form (3CH + 1 RHY)



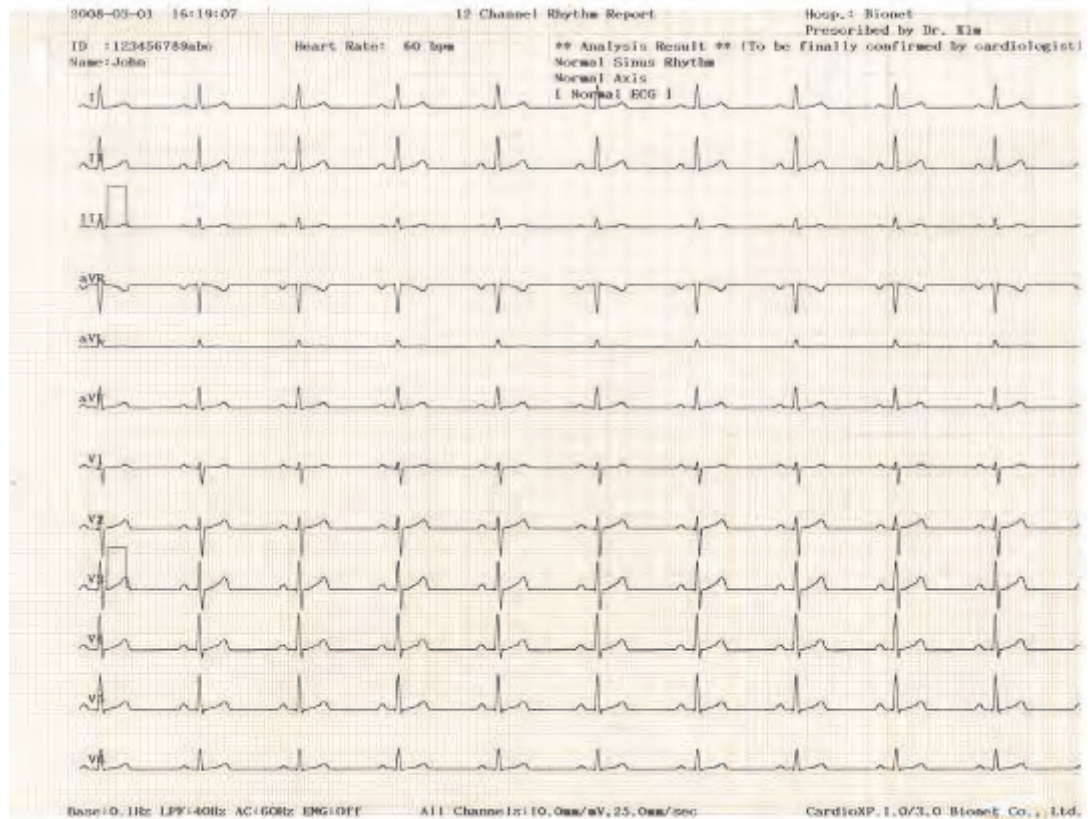
Recording Printing Form (3 CH + 3 RHY)



Recording Printing Form (6 CH + 1 RHY)

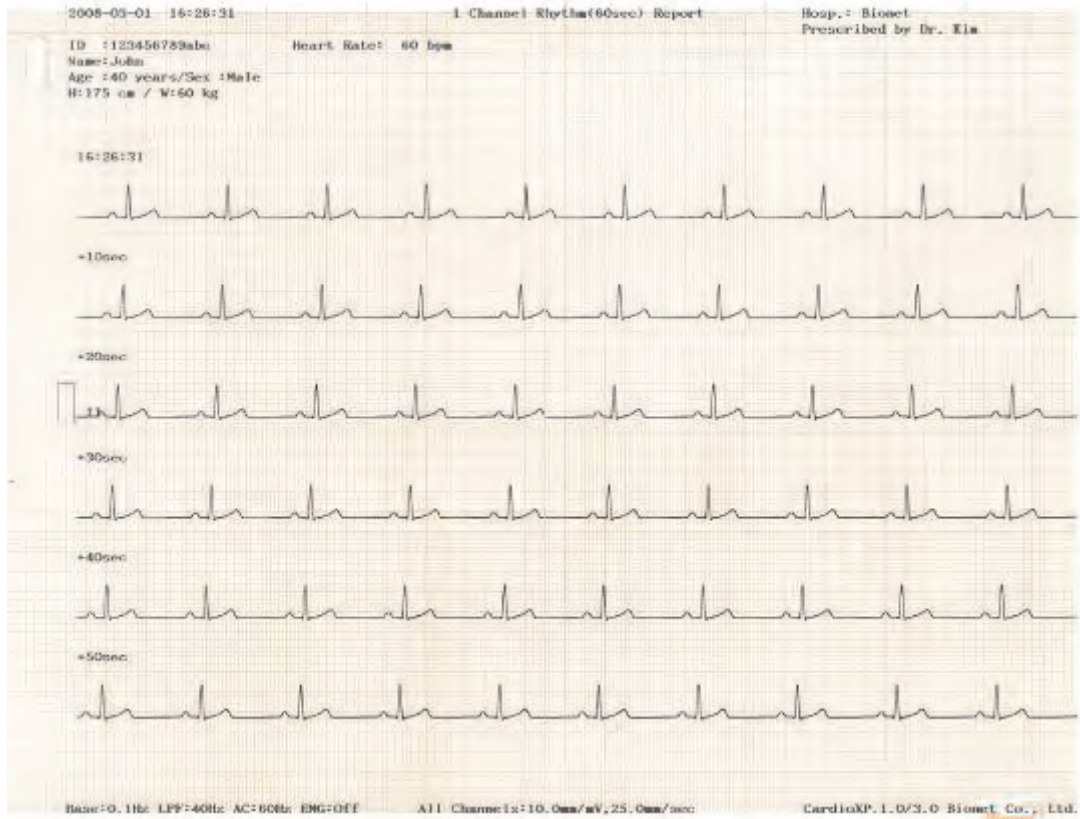


Recording Printing Form (12 CH)



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Recording Printing Form (60 SEC)

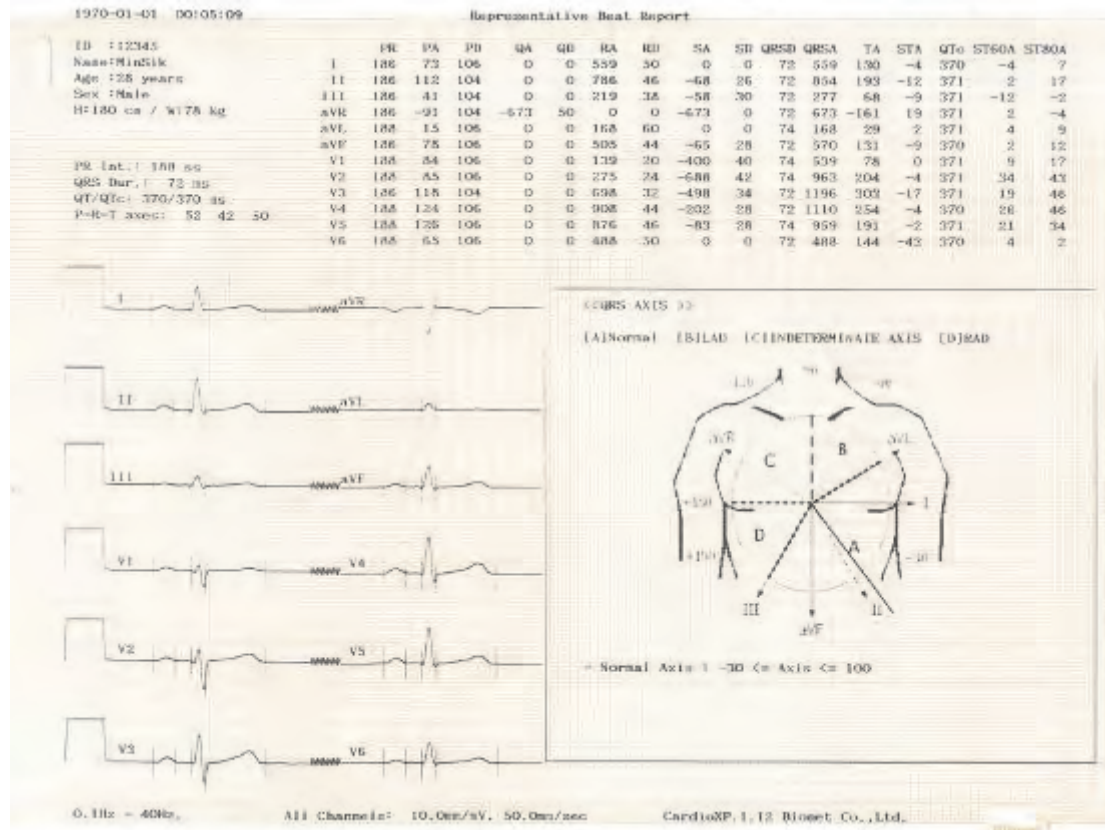


Recording Printing Form (BEAT REPORT - TEXT)

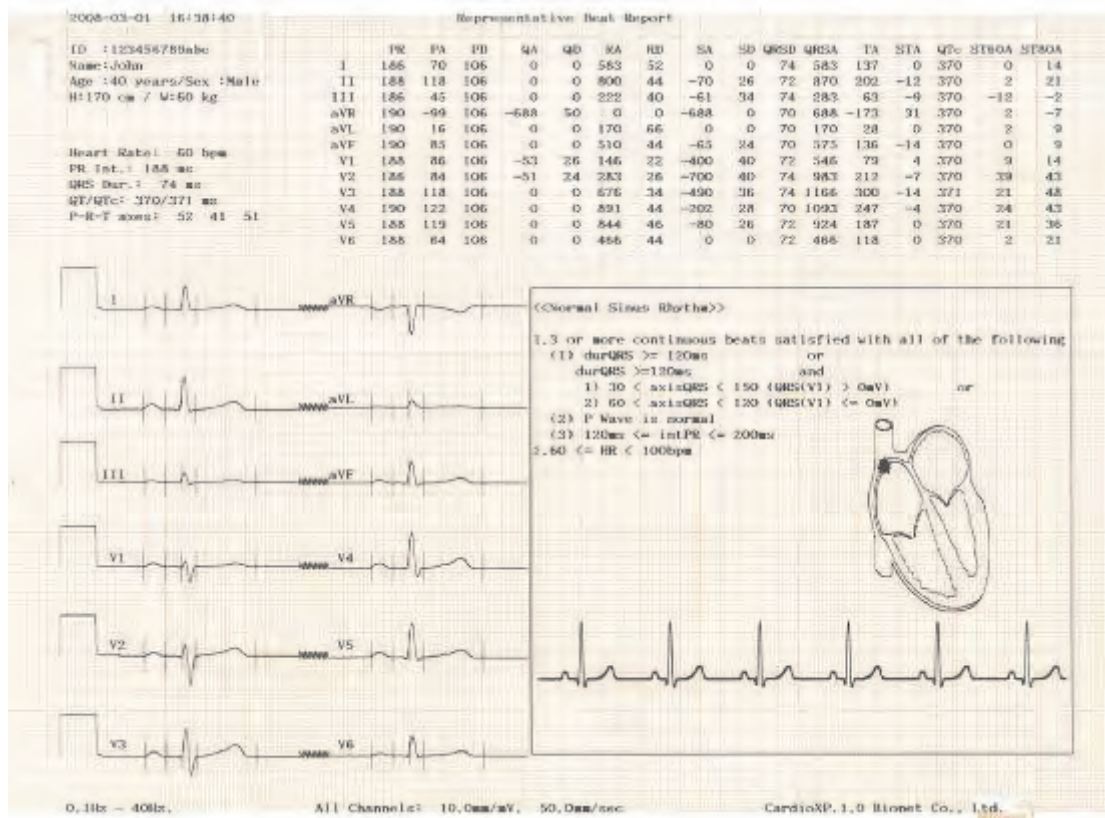


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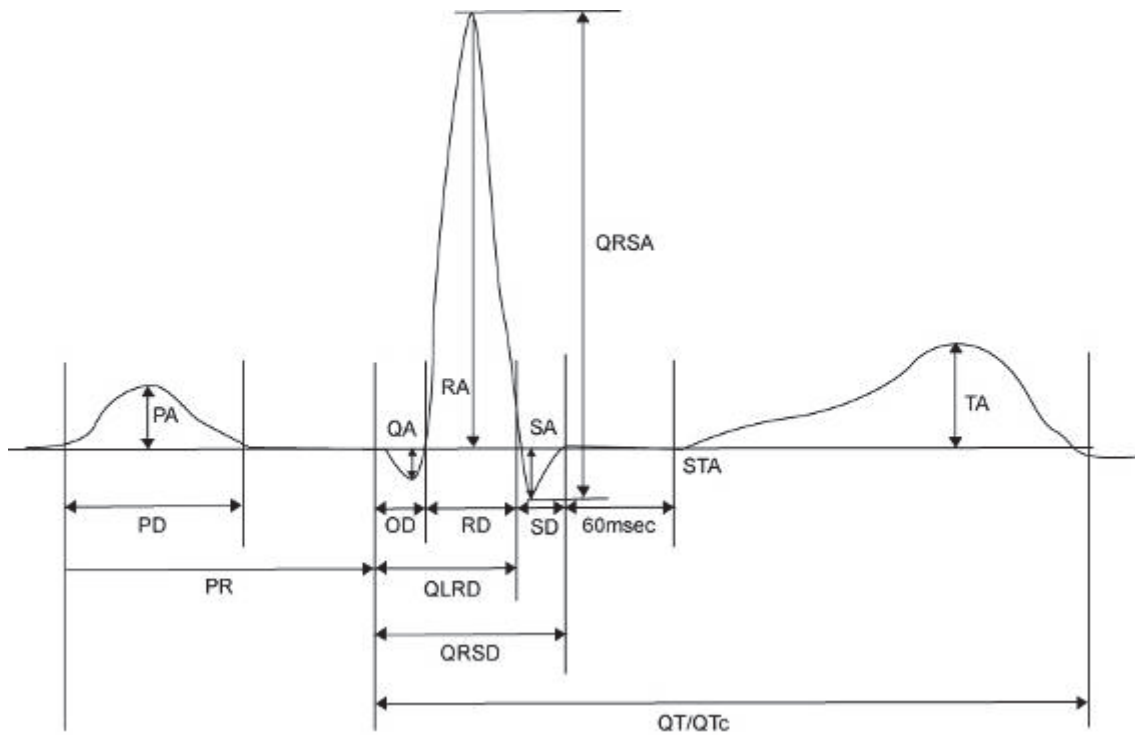
Recording Printing Form (BEAT REPORT - VECTOR)



Recording Printing Form (BEAT REPORT - GUIDE)



* The variable of the BEAT REPORT

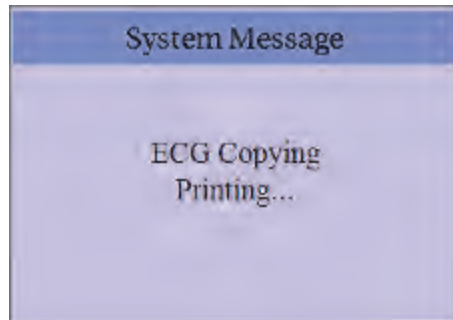


- PR: PR Interval
- PA: P Amplitude
- PD: P Duration
- QA: Q Amplitude
- OD: Q Duration
- RA: R Amplitude
- RD: R Duration
- SA: S Amplitude
- SD: S Duration
- QLRD: Duration between Q and Last R
- QRSD: QRS Duration
- QRSA: QRS Amplitude
- TA: T Amplitude
- STA: ST Amplitude
- QTc: Q-T Interval corrected

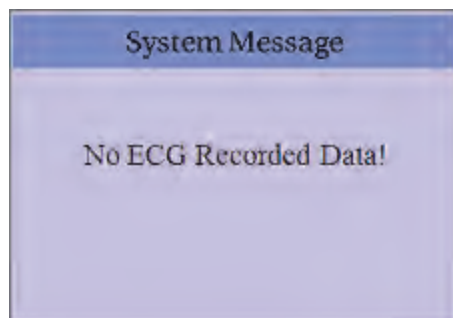
9) Copy

It is a function to print out the same report as the previously printed one or to print out the previously saved ECG data after modifying the information such as filter, the size of the signals, printing speed, channel or rhythm setting.

When pressing the 'COPY' key on the control panel, the message as shown below will appear and the report the as the previous one will be printed out.



If you press the COPY key without having the previous report, a message as below will show up for a second and it will show you the state of the system setting.

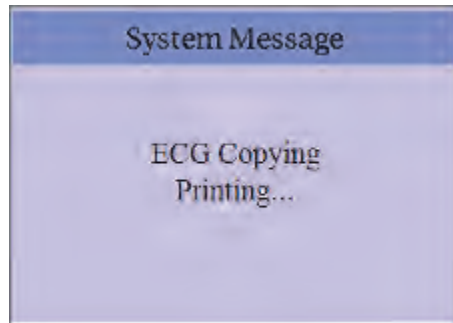


Note

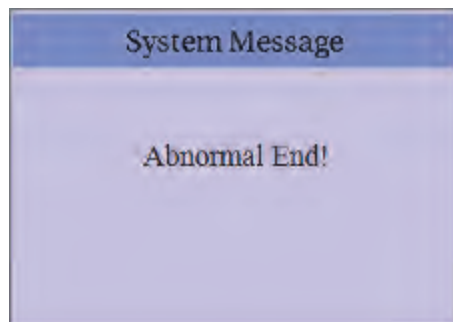
When changing the printing form to 60 sec after printing out the 10-second recording or vice versa, it is considered that the data does not exist.

If you change the filter towards the previously saved ECG, it will adapt the new filter.

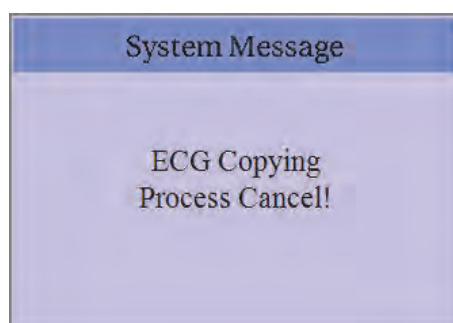
When the new filter is adapted completely, it will start printing after showing the message as below.



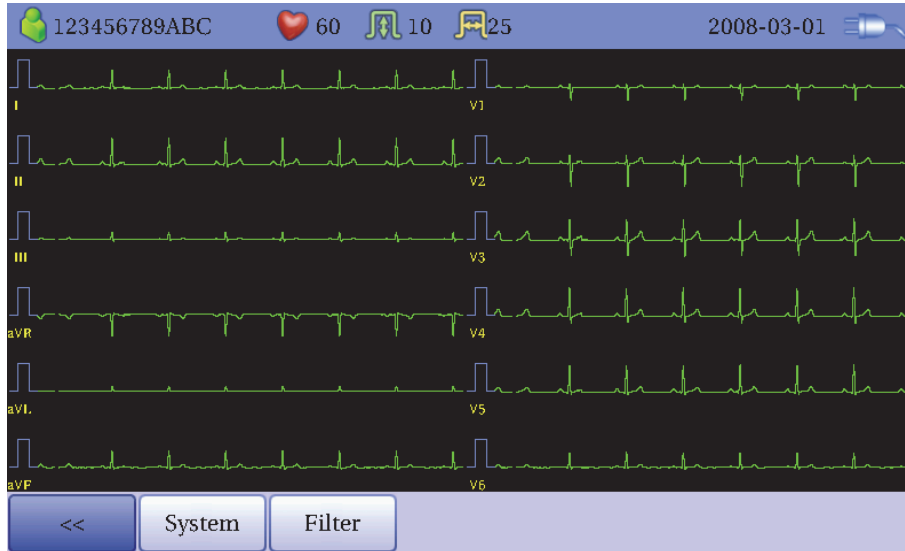
When printing is abnormal completed, the state of the system setting will be displayed after showing the message as shown below for a second.



If you want to stop the process of printing, press the 'ESC' key. Then the process will stop and you will see the ECG Main page after the message shown for a second as below.



10) System Setup



When pressing the '>>' button at the ECG Main page, a 'System' button, which allows you to select the System Setup menu, will be shown.

System Setup menu consists of Basic Setup, Network Setup, Hospital Setup and Record Setup and you can change the setting at each window. The main page shows Basic Setup.

After finishing the setting, press OK to save the new information or press Cancel to cancel it. You can choose Exit or ESC button to exit from the system setup menu.

'Default' button is used to default every setting.

Basic Setup

When choosing Basic menu at the left side of the System Setup page, you will see the page for Basic Setup.

Basic Setup consists of the menus for date and time setting, volume control, coordinates of the touchpad setting, lead fault signal ON/OFF, Pacemaker signal ON/OFF, unit setting, language setting and starting option setting menu.

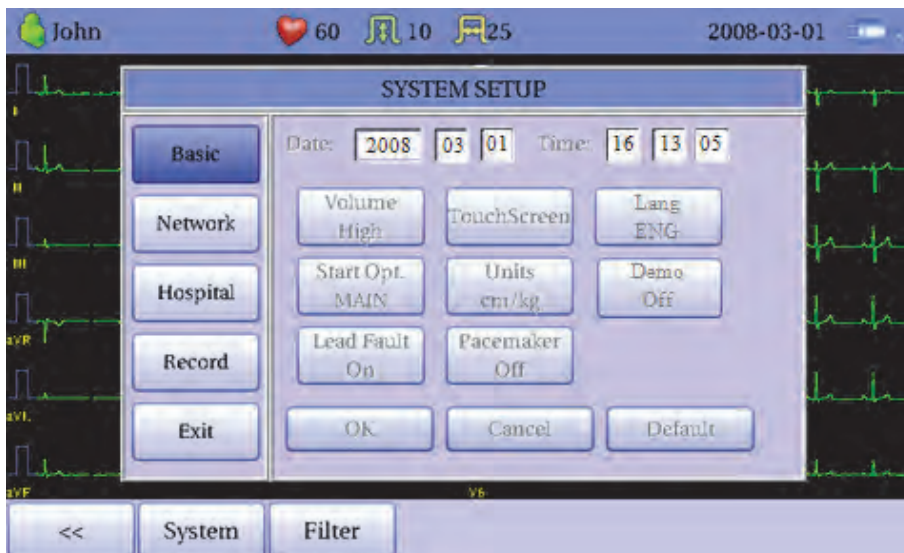


Date and Time Setting

After choosing the System Setup menu, press the Basic button then the focus will go to the Date item.

By using the touch screen or rotating the rotary switch, choose the Date (yyyy/mm/dd) or Time (hr/min/sec), then the keypad will show up. You can set up the information by using this keypad.

The Focus will go 'year → month → day → hour → minute → second' consecutively.



Volume control

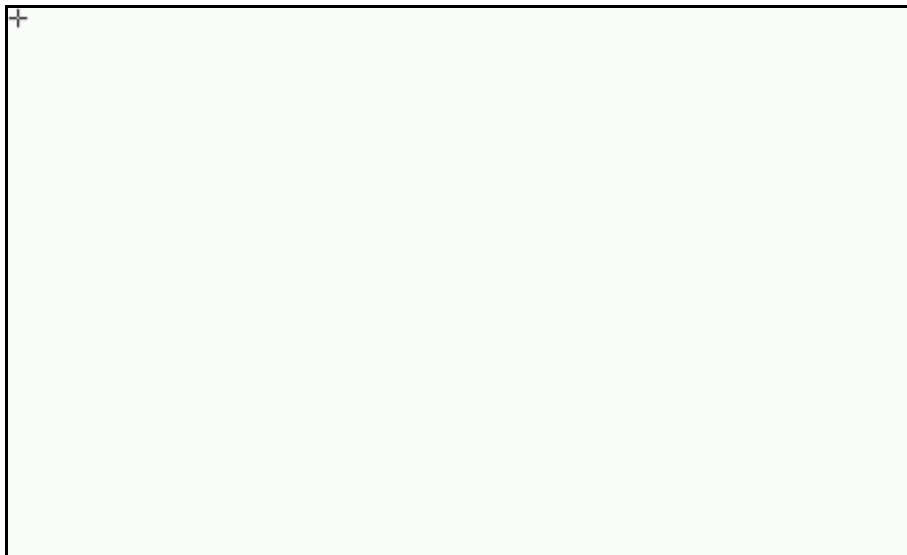
When selecting the Volume menu, a small POP-UP window will show up as below, and then you can select the volume you want.



Touch Setup

This is a menu to set up the coordinates of the touchpad. When selecting the Touch menu at the Basic Setup page, system setup page will disappear and the coordinates for setting calibration will appear as shown below. Follow the instructions shown on the screen, and then the coordinates will be set up.

Please input the information in the right place, otherwise the touchpad may not work properly.



Note

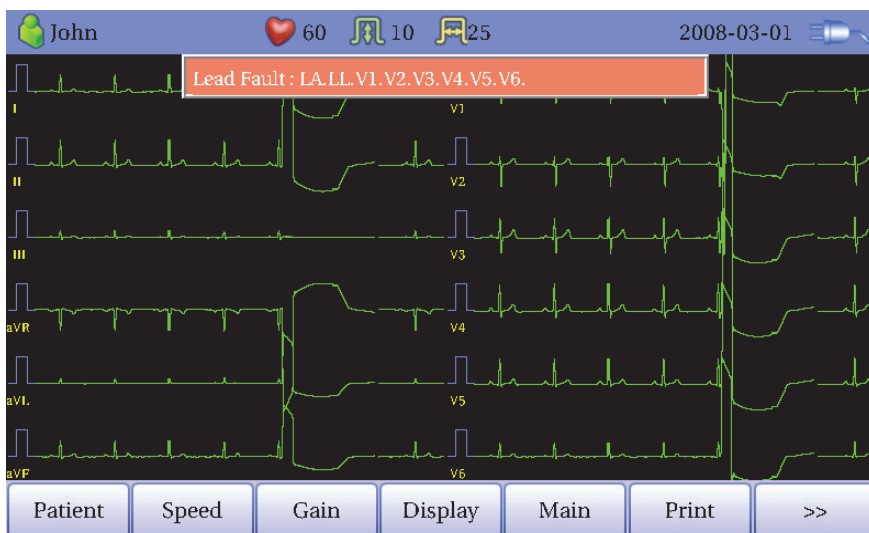
When selecting the Touch Setup, the page will disappear and the setting process will begin.
All of the other keys will not operate until the setting is completed.

Lead Fault Message setting

When the connecting between the patient and Lead is improper, lead fault can occur. In that case, you can choose whether to have the lead fault message on the ECG Main page or not. You can select ON or OFF by clicking the 'Lead Fault' item. When it is on, the lead fault message will be generated, while when it is off, the message will not be shown.



The message will show the information about the channel with lead fault together.



Note

- When 'RL' Lead is fault, the message will say that every lead is fault. ("Lead Fault! All Leads.")
- When the lead fault happens while monitoring or recording, a message will be shown with a beep.
- When having the Lead Fault, the Pacemaker signals may not be detected. Also, as it can influence on diagnosis, please measure the ECG data again.

Pacemaker signal printing setting

In case of using the pacemaker signals, you can choose whether to print out the location of the pacemaker when monitoring or recording.

You can select ON or OFF by clicking the 'Pacemaker' item. When it is on, the location of the pacemaker will be printed out, while when it is off, it will not be printed out.



Note

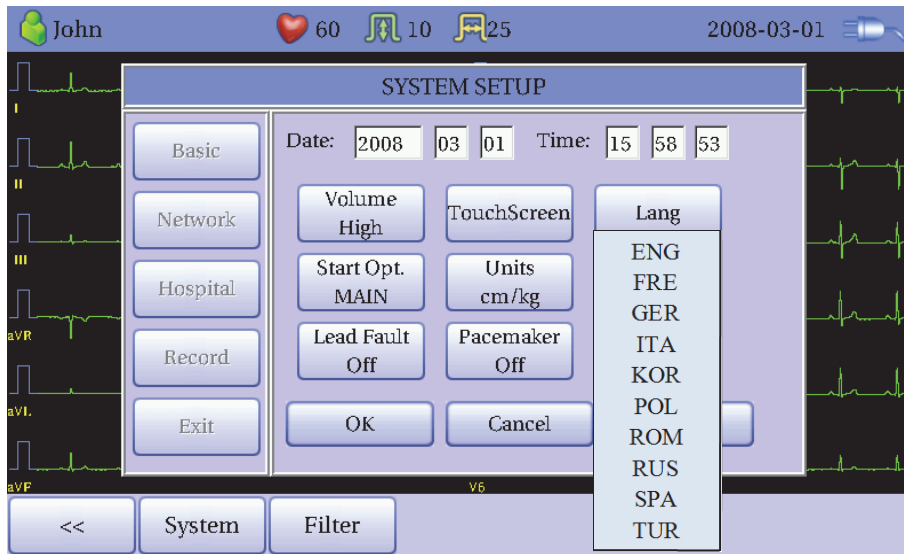
- It is recommended to set the pacemaker off for normal use and only when the patient uses the pacemaker, set it on.
- When having the Lead Fault, the Pacemaker signals may not be detected.

Language Setting

As shown below, when selecting Language menu at the Basic Setup page, you can choose the language among English, German, French, Russian, Italian, Spanish, Chinese and Korean.

In case of English, the two versions of (ENG) and (ENG_US) are available. If you select (ENG_US), the result of diagnosis will be printed in the capital letters.

Select the language you want to use and click the OK button and then you can use the service in the chosen language.



Unit Setting

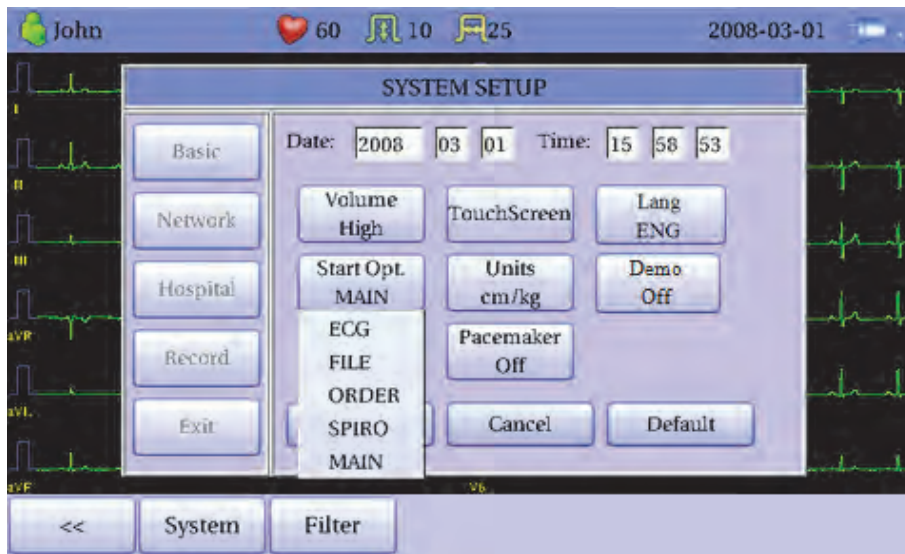
This menu is to select the units for height and weight of the patient. When you click 'Units' button, cm/kg or Inch/Lbs will be shown.

If you select Inch/Lbs unit, the patient's height information will be expressed in *** Ft (Feet) *** Inch.



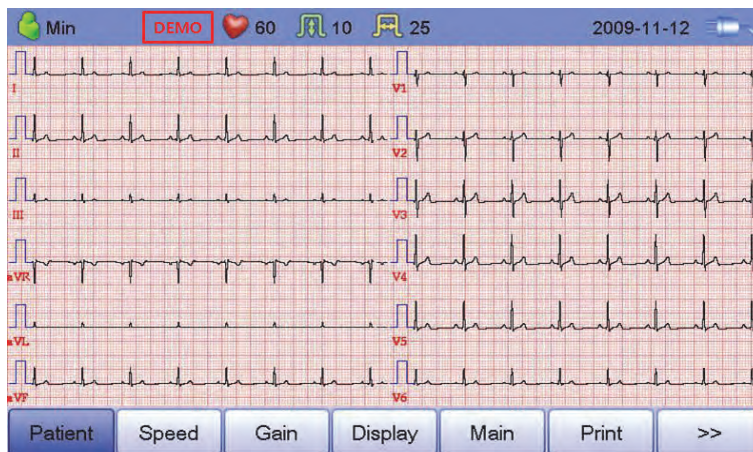
User Page

You can set up the index page shown at the time of initial boot up, according to the common dialog. When clicking the 'Start Option' button, a small pop-up menu will appear and you can select the initial page you want to have among MAIN, ECG, FILE and ORDER.



Demo Mode

Set the demonstration function on/off. If the demonstration function is set on, there is 60bpm sinus normal rhythm signal on the screen, and there is mark [DEMO] at the top of the screen. The all the functions as Rhythm, Record, Copy, Communication and etc could be tested.



Network Setup

When connecting the equipment with LAN to interface with the outside PC, network setup is needed. Network IP is required and DNS is not used.

When selecting the Network menu at the left side of the System Setup page, Network Setup page will show up at the right side.

When selecting Auto IP, input the equipment's IP, while selecting Manual IP, provide the information about the equipment's IP, IP of the Database server PC, 'Subnet Mask' and 'Gate Way'.



When selecting one of the 'IP', 'Subnet Mask', 'Gate Way' or 'PC', the keypad will show up. Then, input the information required and press OK button to save or ESC to cancel the information.

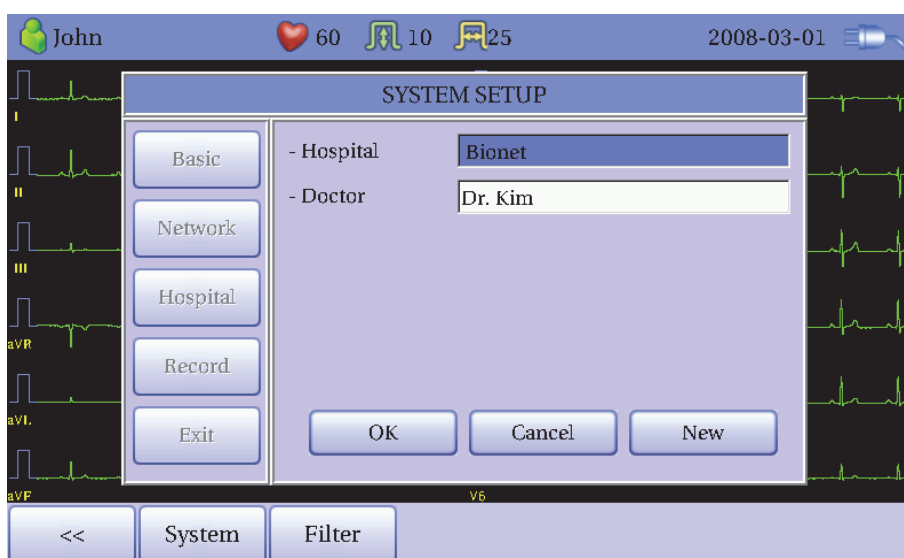
After the Network setting, press OK button to save or Cancel button to cancel.

Hospital Setup

When selecting the 'Hospital' menu at the left side of the System Setup page, Hospital Setup page will show up at the right side.

You can input the information about the names of the hospitals and doctors.

When clicking the area to input the information, the keypad will show up. Then you can input the information required and press OK button to save or ESC to cancel the information.



Record Setup

When selecting the 'Record' menu at the left side of the System Setup page, the record setup page will show up at the right side.

Record Setup menu consists of the 'AUTO' key on the control panel setup item and auto diagnosis setup item.

'AUTO' key setting

When the 'Store' menu has the focus, click it to set up 'Yes' or 'No'.

When 'Yes' is selected, you can operate the ECG test by pressing the 'AUTO' key on the control panel and the ECG data will be automatically saved, but when 'No' is selected, the ECG data will not be saved. Default is set as 'Yes'.

When the 'Print Out' menu has the focus, click it to set up 'Yes' or 'No'.

When 'Yes' is selected, you can operate the ECG test by pressing the 'AUTO' key on the control panel and the ECG data will be automatically print out, but when 'No' is selected, the ECG data will not be printed out. Default is set as 'Yes'.





When selecting the 'Export' menu, a small POP-UP menu as below will appear and it will disappear when selecting one of None, PC, USB or SD.

When 'PC' is selected, the ECG data will be automatically saved to the PC and when 'USB' is selected, the data will be saved in the external USB memory. In case of 'SD', the data will be saved in the external SD Card.



Note

When you remove the external device after sending to SD Card or USB Memory, you should click icon   that is correct to each device on top of the main screen and remove the device. Otherwise data can be damaged.

Auto diagnosis setting

When selecting the 'Diagnosis' menu, a small POP-UP menu as below will appear and it will disappear when selecting one of OFF, Standard or Professional.

When 'OFF' is selected, the content of diagnosis will not be printed out, whereas when 'Standard' is selected, the basic information of diagnosis will be printed out at the top of the chart paper. In case of 'Professional', various information of diagnosis will be printed out.



When selecting the 'ST Level' menu, a small POP-UP menu as below will appear and it will disappear when selecting one of AUTO, 60msec or 80msec.

When 'AUTO' is selected, J Point associated with ST Level will be automatically set up at the time of printing. When '60msec' is selected, J Point will be set as 60msec and '80msec' for 80msec.

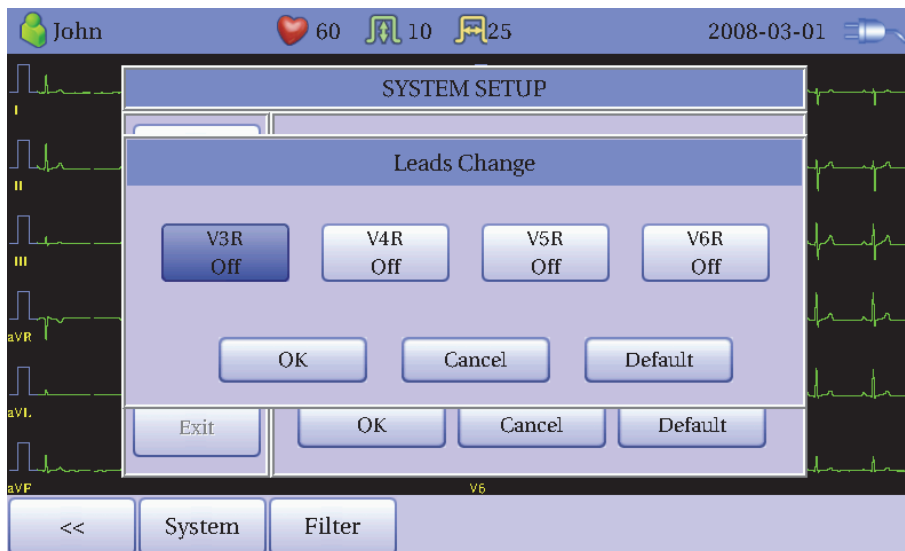


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'V Change' menu is used to set up the V3 ~ V6 on the printing paper when diagnosing children in which the location of V3 ~ V6 electrodes need to be changed from left to right.



Basically, the 'V Change' is set as 'None' and when you click this menu, a 'Leads Change' POP-UP window will show up as below. Each time you select the V3R, V4R, V5R or V6R, it will be on or off. When one is selected, the letter R will be seen at the end of the chosen channel (V3 → V3R), otherwise it will not.



WARNING

Do not touch the patient cable or the equipment when using the cardiac defibrillator.

WARNING

Please make sure the connector does not touch the conductive parts or the ground when connecting the electrodes or the patient cable.

WARNING

The ECG patient cable provided is supposed to use for ECG measuring. Do not use it to measure breathing.

Caution

Do not use Cardio XP with electrosurgical equipment.

Caution

Use the electrodes same as the provided ones or the one with biocompatibility certificate authorized by the international standard.

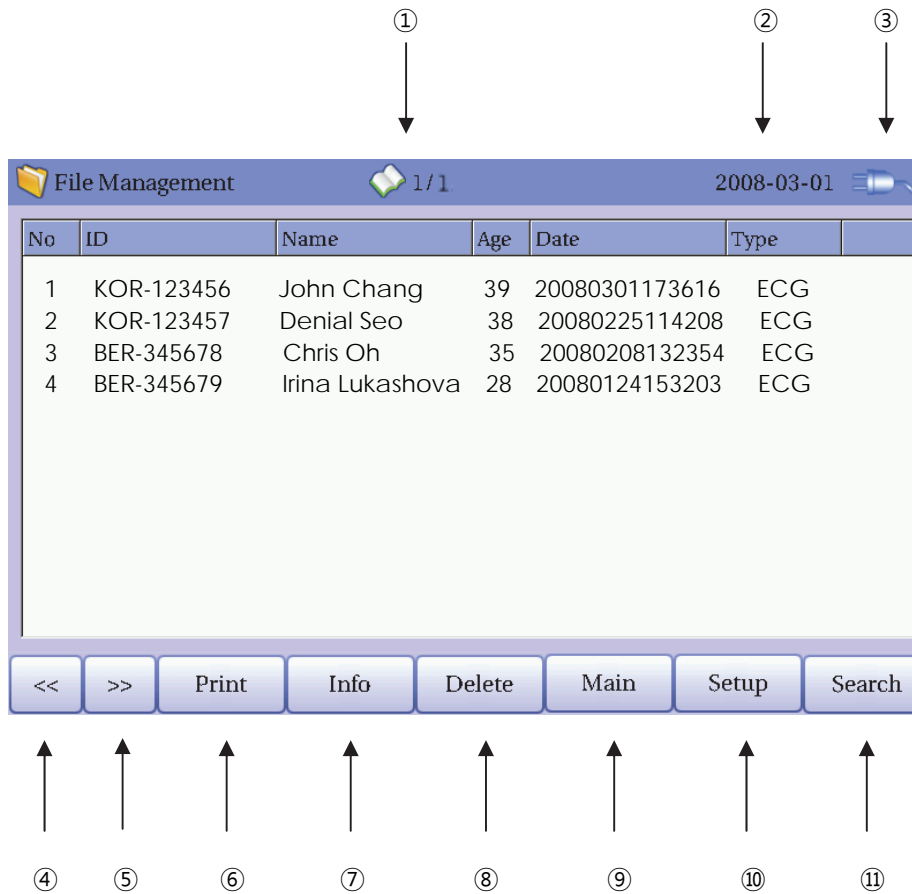
Caution

When the patient, who had an operation to have a heart assist device, uses Cardio XP, it should be done under the supervision of a health care professional.

3. ECG file management

- 1) Display and function
- 2) Data printing
- 3) Patient information
- 4) Data deleting
- 5) Environment setting
- 6) Switching menu
- 7) Data search
- 8) Data transfer
- 9) Data import

1) Display and function



Page information

- For example, [1/20] means that you see the first page among total 20 pages. 1 Page contains 12 Data.

Current date and time

State of battery or AC power connection

Button to skip to the previous page

Button to skip to the next page

Button to print out the chosen data saved

Button to check the patient's information of the chosen data saved

Button to delete the data

Button to move to other main screen from 'File Management'

Button to set up the environment of 'File Management'

Button to search the data you want

At the initial file management page, the first data of the list has the focus. The focus will automatically move to the menu bar at the bottom of the screen, when you click the data by touching the screen or rotating the rotary key on the control panel.

If there is no data in the page, the focus can be found on [<<] button.

When there is no patient information you want to select, please press [<<] or [>>] button or the Search menu to move to other pages.

- Menu direction (Rotary Key's right spin)

[<<] → [>>] → Print → Info → Delete → Setup → Main → Search → Data List

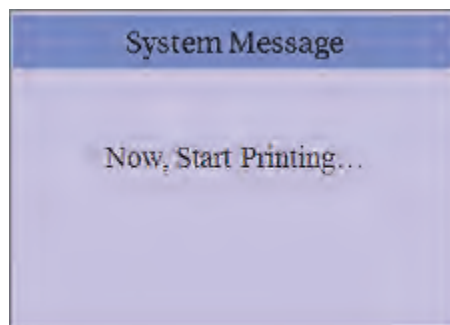
- Menu direction (Rotary Key's left spin)

[<<] → Data List → Search → Main → Setup → Delete → Info → Print → [>>]

2) Data printing

When selecting a saved data at the ECG file management page by using a rotary key or a touch screen, a focus will appear at the data list.

Press the 'Print' button to print out the data. Then you will see a message as shown below.



3) Patient information

When selecting a saved data at the ECG file management page by using a rotary key or a touch screen, a focus will appear at the data list.

Press the 'Info' button. Then you will see a 'Patient Information' window as shown below.

After you edit the item's information, when pressing OK button, the information will be saved, while pressing cancel button will cancel the setting. When pressing the 'New' button, all of the information will be initialized.

No	ID
Patient Information	
ID	123456789ABC
Name	John
Age	40 years
Gender	Male
Height	175 cm
Weight	65 kg
Smoke	Yes 1/2/12
Department	HIC
Room No	6
Race	Oriental

OK Cancel New

<< >> Print Info Delete Main Setup Search

4) Data deleting

When pressing the 'Delete' button, a small pop-up menu will show up. You can choose to press the 'select' or 'all' button.

When you press the 'Select' button, one data will be deleted, but if you press the 'All' button, every data in the list will be deleted.

In order to help the user not to make a mistake when deleting the data, a message shown as below will appear to reaffirm whether you really want to delete the data.

System Message

Do you want to delete data?

Yes No

System Message

Do you want to delete all data?

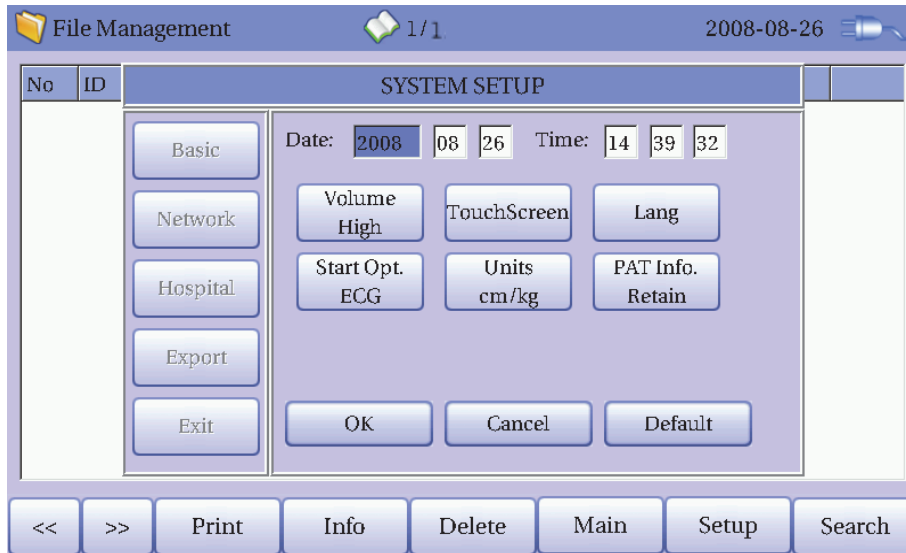
Yes No

Caution

Please think carefully before selecting the 'All' button, as it will delete all of the ECG data.

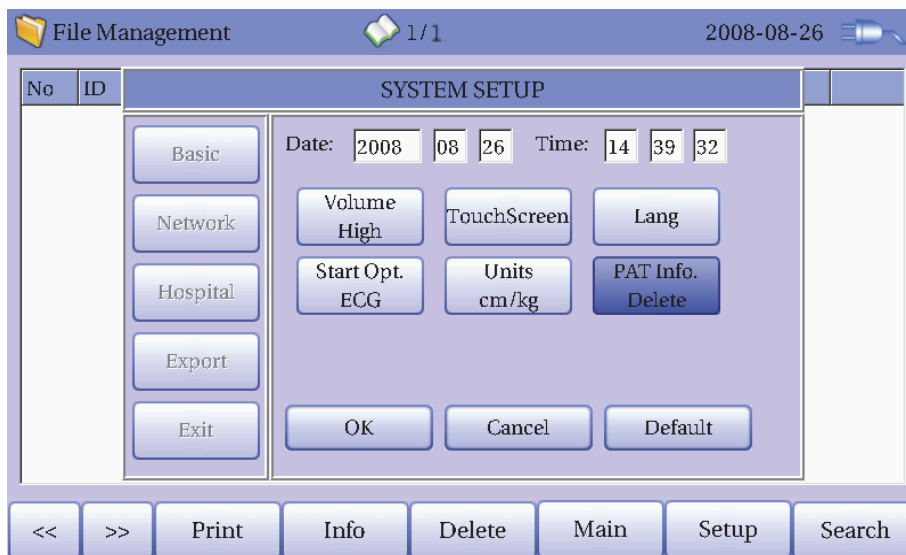
5) Environment setting

When clicking the 'Setup' button at the ECG data file management page, you will see a 'System Setup' window as shown below.



'PAT Info.' menu is to set up whether the patient information is retained or not, when you move the main screen of the ECG. When you click the menu, 'Retain' will be set up and when clicking the menu again, 'Delete' will be set up. Default is set as 'Delete'.

- 'Delete': To set up the patient information is deleted, when you move the main screen of the ECG.
- 'Retain': To set up the patient information is retained, when you move the main screen of the ECG. If some doctor can has more than one record for the same patient. The doctor doesn't want to admit the same data twice or more for the same patient again and again. It's more comfortable for the doctor.



Note

The steps for Network & Hospital Setting are identical with the steps for ECG Main setting.

When clicking the 'Export' button, you will see 'Export' window as shown below.



When clicking the 'Target' button, a POP-UP window will show up and it will disappear when selecting one of PC, SD or USB.

- PC: To save the data in the PC connected with the equipment
- SD: To save the data in the external SD Card
- USB: To save the data in the external USB Memory

When clicking the 'Method' button, a small POP-UP window will show up and it will disappear when selecting Manual, Select, All or New. 'Method' menu is used to select the user's options when transferring the data.

- Manual: To select the method manually
- Select: To transfer the selected data
- All: To transfer all data
- New: To transfer the newly saved data

When clicking the 'Format' button, a small POP-UP window will show up and it will disappear when selecting EKG, MFER or XML. 'Format' menu is used to select the user's options when transferring the data.

- EKG: To save the data by type of '***.ekg'
- MFER: To save the data by type of '***.mwf'
- XML: To save the data by type of '***.xml'
- JPEG: To save the data by type of '***.jpg'
(JPEG Size: Select the resolution of JPEG file)
- PDF: To save the data by type of '***.pdf'

When clicking the 'Delete' button, a small POP-UP window will show up and it will disappear when selecting Yes or No. 'Delete' menu is used to select the user's options after the data has transferred.

- Yes: To delete the data after it has transferred
- No: To not delete the data after it has transferred

Caution

- When you use external SD card, it is highly recommended to use less than 1G bytes. Otherwise it can bring about some error on exporting files.
- Under 'Export' menu window, if 'ECG' is selected as the 'Format' menu, you can select 'All' or 'All New' for 'Method' menu.

6) Switching menu

When selecting the 'Main' button at the main page of 'File management', a small pop-up window will show up. You can choose ECG or ORDER to go to the chosen page.

The patient's information of selected data does not transmit when skipping to 'Order Management' screen. But it depends on the setting value of 'PAT Info.' menu when skipping to 'ECG' main screen.

- ECG: skip to ECG main screen
- ORDER: skip to 'Order Management' screen

7) Data search

When clicking the 'Search' button at the ECG data file management page, you will see a 'Patient Search' window as shown below. If you rotate the rotary key, the 'search condition' button will have a focus. Press the 'Start' button after inputting the information about ID, Name, Date or Age.

When the search takes a long time, a message will show up to let you know the process. After searching, you will see a data search result page.

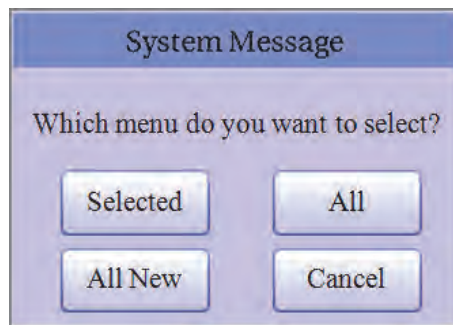
The screenshot shows a 'Patient Search' dialog box. At the top, it says 'File Management' and '0/1' with a date '2008-03-01'. The dialog has a table with columns 'No' and 'ID'. Below the table, there's a 'Search Condition' dropdown menu set to 'ID'. To the right are 'Find', 'Close', and 'All' buttons. Below the dropdown are input fields for '- ID', '- Name', '- Day' (with 'To' field), and '- Age' (with 'To' field). At the bottom of the dialog is a navigation bar with buttons: '<<', '>>', 'Print', 'Info', 'Delete', 'Main', 'Setup', and 'Search'.

8) Data transfer

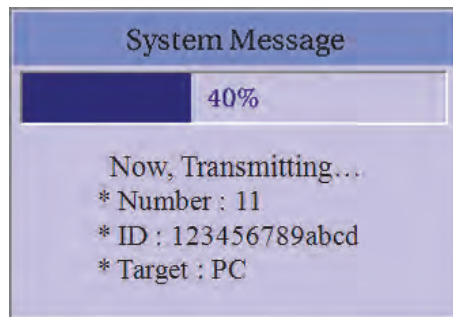
You can transfer the saved data to the external device at the ECG data file management page by using the 'NETWORK' key on the control panel.

When pressing the 'NETWORK' key, a message will show up, asking which menu you want to select.

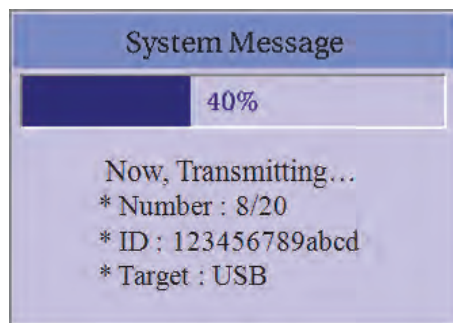
- Selected: To transfer the selected data
- All: To transfer all data
- All New: To transfer the newly saved data



If you transfer a selected data, a message with process speed or other information will be shown as below.



If you transfer all of the data, a message with process speed or other information will be shown as below. In this case, the total number of files and the file being transferred currently will be displayed.



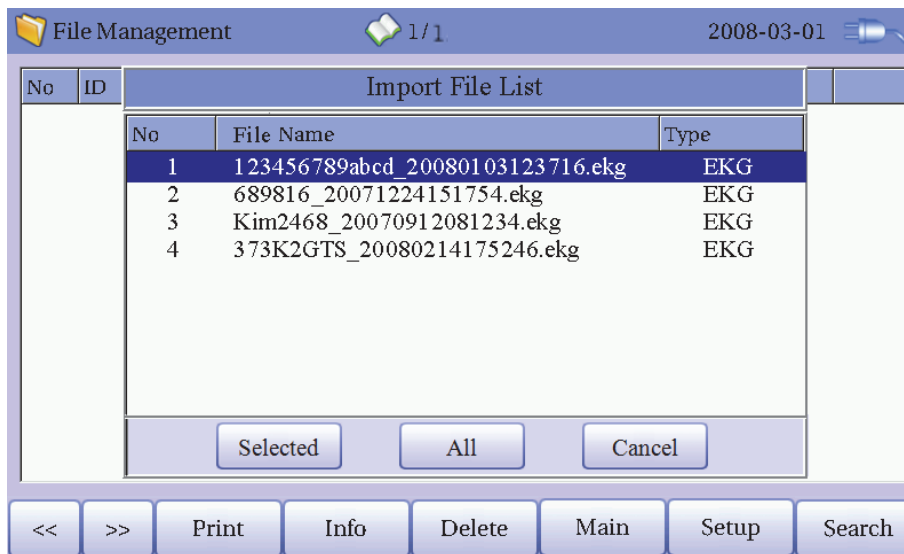
9) Data import

You can import the saved data from the external device at the ECG data file management page by using the 'RECORD' key on the control panel.

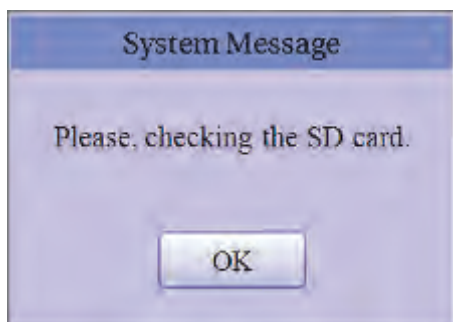
When pressing the 'RECORD' key, a message will show up, asking which device you want to import.



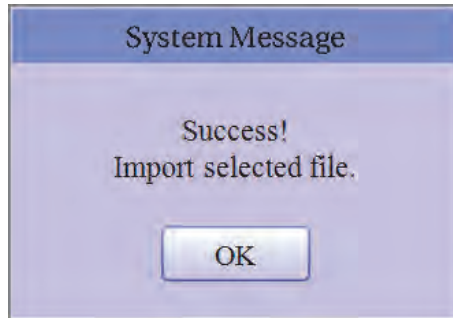
If it is connected properly the external device (SD card or USB memory) to CardioXP, 'Import File List' screen will be shown as below.



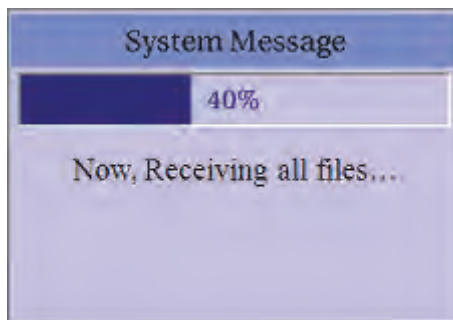
If it is not connected the external device (SD card or USB memory) to CardioXP, the error message will be shown as below.



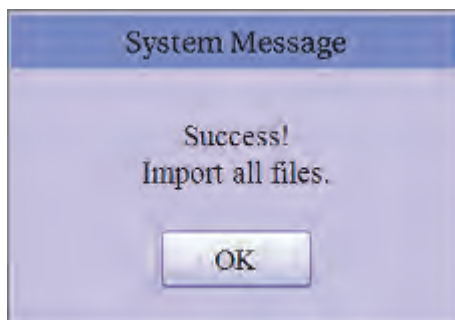
If you select the 'Selected' menu in the 'Import File List' screen, receiving a selected data from the external device and a system message will be shown as below.



If you select the 'All' menu in the 'Import File List' screen, a system message with process speed will be shown as below.



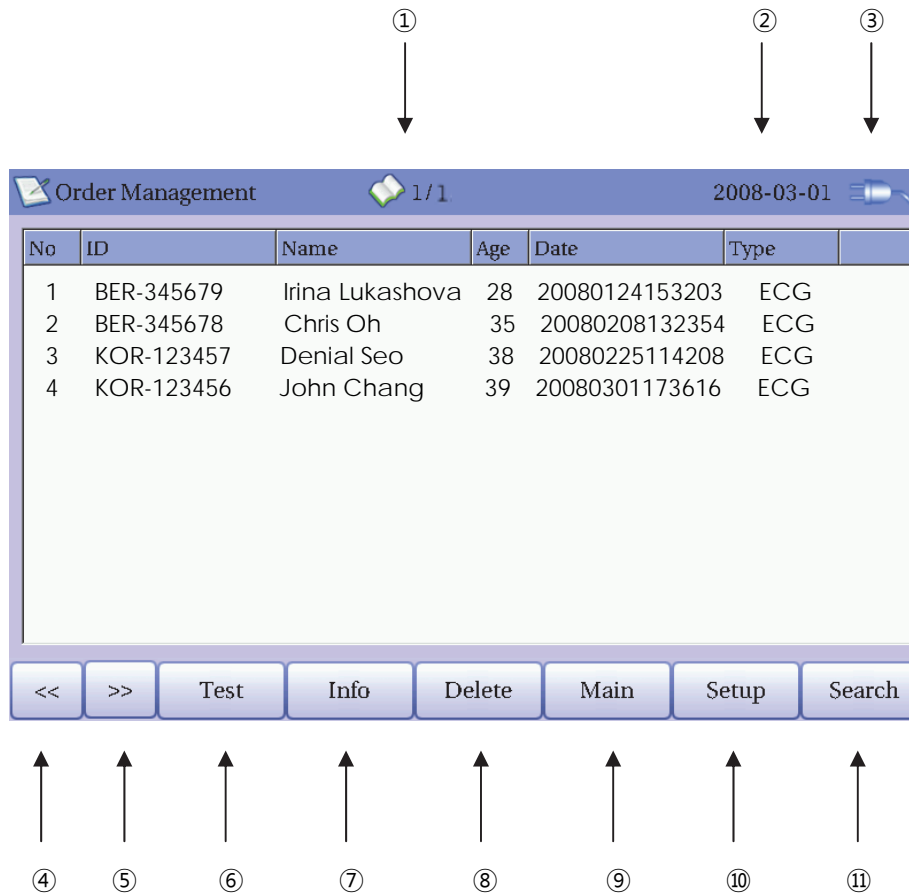
After receiving all data from the external device, a system message will be shown as below.



4. ECG order management

- 1) Display and function
- 2) ECG recording
- 3) Patient information
- 4) Data deleting
- 5) Environment setting
- 6) Switching menu
- 7) Data search

1) Display and function



- ① Page information
- For example, [1/20] means that you see the first page among total 20 pages. 1 page contains 12 Data.
- ② Current date and time
- ③ State of battery or AC power connection
- ④ Button to skip to the previous page
- ⑤ Button to skip to the next page
- ⑥ Button to go to the ECG main screen to start measuring the patient's ECG data with the information in the chosen order data
- ⑦ Button to check the patient's information of the chosen order data
- ⑧ Button to delete the order data
- ⑨ Button to move to other main screen from 'Order Management'
- ⑩ Button to set up the environment of 'Order Management'
- ⑪ Button to search the data you want

At the initial file management page, the first data of the list has the focus. The focus will automatically move to the menu bar at the bottom of the screen, when you click the data by touching the screen or rotating the rotary key on the control panel.

If there is no data in the page, the focus can be found on [<<] button.

When there is no patient information you want to select, please press [<<] or [>>] button or the Search menu to move to other pages.

- Menu direction (Rotary Key's right spin)
[<<] → [>>] → Print → Info → Delete → Setup → Main → Search → Data List
- Menu direction (Rotary Key's left spin)
[<<] → Data List → Search → Main → Setup → Delete → Info → Print → [>>]

2) Test (ECG recording)

Go to the ECG main screen to start measuring the patient's ECG data with the information in the chosen order data.

After moving to the ECG main screen to start measuring the patient's ECG data, you do not need to input the patient's information. Because the patient's information is already saved,

3) Patient information

When selecting a saved data at the ECG file management page by using a rotary key or a touch screen, a focus will appear at the data list.

Press the 'Info' button to see the 'Patient Information' page. After checking all of the information, press the OK button and then the 'Patient Information' page will disappear.

Order Management 1/1 2008-03-01

No	ID	Patient Information	
		ID	<input type="text"/>
		Name	<input type="text"/>
		Age	<input type="text"/> years
		Smoke	<input type="text"/>
		Gender	<input type="text"/>
		Department	<input type="text"/>
		Height	<input type="text"/> cm
		Room No	<input type="text"/>
		Weight	<input type="text"/> kg
		Race	<input type="text"/>

OK

<< >> Test Info Delete Main Setup Search

4) Data deleting

When pressing the 'Delete' button, a small pop-up menu will show up. You can choose to press the 'select' or 'all' button.

When you press the 'Select' button, one data will be deleted, but if you press the 'All' button, every data in the list will be deleted.

In order to help the user not to make a mistake when deleting the data, a message shown as below will appear to reaffirm whether you really want to delete the data.

System Message

Do you want to delete data?

Yes No

System Message

Do you want to delete all data?

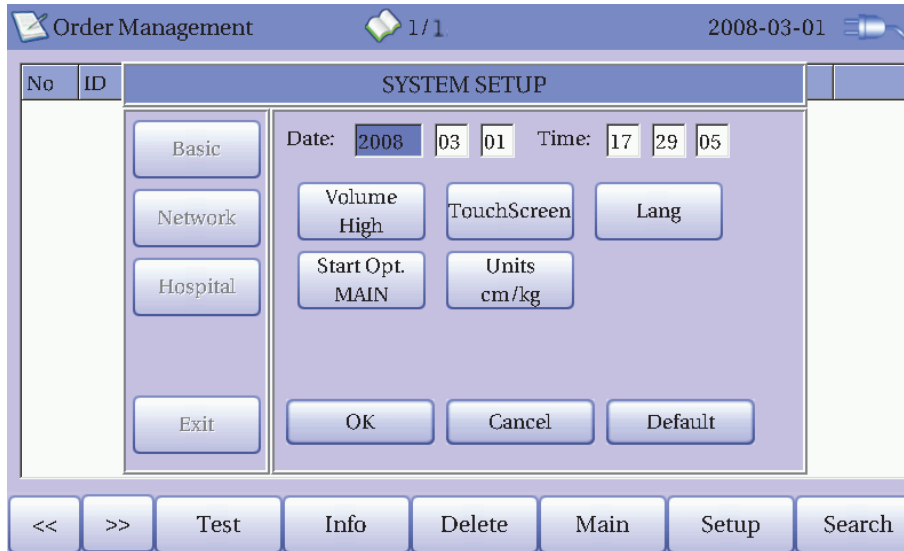
Yes No

Caution

Please think carefully before selecting the 'All' button, as it will delete all of the ECG data.

5) Environment setting

When clicking the 'Setup' button at the ECG data order management page, you will see the 'Order System Setup' window as shown below.



Note

The steps for Network & Hospital Setting are identical with the steps for ECG Main setting.

6) Switching menu

When selecting the Main button at the main page of the ECG file management, a small pop-up window will show up. You can choose ECG or FILE to go to the chosen page.

The patient's information of selected data does not transmit, when moving to other main screen.

- ECG: skip to ECG main screen
- FILE: skip to 'File Management' screen

7) Data search

When clicking the 'Search' button at the ECG data order management page, you will see a 'Patient Search' window as shown below. If you rotate the rotary key, the 'search condition' button will have a focus.

Press the 'Start' button after inputting the information about ID, Name, Date or Age.

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When the search takes a long time, a message will show up to let you know the process. After searching, you will see a data search result page.

The screenshot shows a software window titled "Order Management" with a date of "2008-03-01" and a page indicator "1/1". The main content is a "Patient Search" dialog box. It features a "Search Condition" dropdown menu set to "ID". Below this are input fields for "- ID", "- Name", "- Day" (with a "To" label), and "- Age" (with a "To" label). To the right of these fields are three buttons: "Find", "Close", and "All". At the bottom of the window, there is a navigation bar with buttons for "<<", ">>", "Test", "Info", "Delete", "Main", "Setup", and "Search".

5. System Management

- 1) Maintenance and Cleaning
- 2) Regular Check-up
- 3) Trouble Shooting

1) Maintenance and Cleaning

There are many ways to clean Cardio XP, but it is better to use our recommendation to avoid damage or uncleanness.

The warranty does not cover the problems resulting from the use of harmful substances (unauthorized substances).

Caution
After cleaning the product, check the hardware and the electrodes. Do not use the product if it is damaged or old.

Rub the product with gauze with alcohol about once a month to clean the product as well as the electrodes. Do not use lacquer, thinner, ethylene or oxide. Make sure there is no dust or dirt on the cable and limbs and chest electrodes and clean them with wet gauze (40°C/104°F) after use and clean it with clinical alcohol once a week.

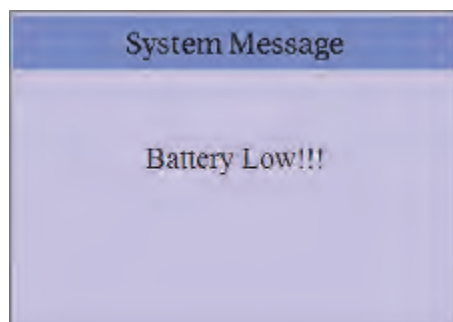
Do not put the product or the ECG cable into the liquid or detergent. Also make sure there is no liquid in the product or the cable.

2) Regular Check-up

Like every other medical product, Cardio XP requires a regular check-up once a year. Please refer to the manual for the information on the check-up.

3) Trouble Shooting

- Printing was not successful:
 - ✓ The cover may not be closed properly. Please close the cover and print again.
- When using the battery power, there was a beep for more than 3 times and a message came as shown below:



✓ The battery is low. Please connect to the AC power to use.

- **The signal is printed out with noise:**

✓ Firstly, check that you set up the AC power filter. If it still makes noise with the AC power supply, please connect grounding line to the grounding electrode of the system.

✓ The grounding should not be used with the AC power's grounding and please connect it to the metal around the patient's bed or the building.

- **When The external USB keyboard is not working properly:**

✓ Connect the external USB keyboard to the USB port before you turn on the power of Cardio XP. If you connect the external USB keyboard to the USB port after you turn on the power of Cardio XP, you should turn off the power of Cardio XP and turn on again.

If it is still not working, please contact our customer service center.

6. Specification

ECG Leads	Simultaneous 12 leads resting ECG
Recording Channel	3CH+1RHV, 3CH+3RHV, 6CH+1RHV, 12CH+1RHV, 1CH 60second and Beat Report
Sensitivity	2.5, 5, 10, 20, Auto (I~aVF: 10, V1~V6: 5) mm/mV
Printing Speed	12.5, 25, 50 mm/sec
Sampling Rate	500 samples/sec
Filters	AC (50/60 Hz, -20dB or better), Muscle (25~35Hz, -3dB or better), Base line drift (0.1Hz, -3dB or better), Low pass filter(off, 40Hz, 100Hz, 150Hz)
Display	800 x 480 pixel resolution, 7" Color TFT wide display 12 channels preview, ID, HR, Sensitivity, Speed, Date, Power status
User Interface	Touch screen, Rotary push-knob
Printer Resolution	Thermal print head, Z-fold paper Report paper - width: A4 (210mm) or Letter (8.5"), - length: A4 (290mm) or Letter (11") Resolution: 8dot/mm(0.125mm pitch)
Patient data	ID, name, age, birth, gender, height, weight, smoke, department, room number, race
Basic Measurement	Heart rate, PR, QRS, QT/QTc, P-R-T axis
ECG Data Storage	Internal Storage for 120 ECGs : Built- in memory
Electrical	Internal noise: 20uV(p-p)max Input circuit: floating input Input impedance: More than 10MΩ Input voltage range: ±5mV CMRR: Greater than 100dB DC offset voltage: ≥ ±300mV Time constant: 3.2 sec Patient leakage current: < 10uA Frequency response: 0.05 ~ 150 with in -3dB Isolated and defibrillation protected
Signal Quality Control	Pacemaker pulse detection Lead fault detection
Line Power	95 ~ 240 VAC, 50/60Hz, 60 VA max
Battery Capacity [Li-Ion]	Normal operation: 3 hours (approx. 300 ECG printouts) on 8 hours charge
Communication	RS-232C Serial port, LAN port, USB, SD Card
Safety Conformity	Class I, Type CF, KFDA, CE
Environmental	Operating temperature: 10 ~ 40 Operating humidity: 30~85%RH Atmospheric pressure: 70 ~ 106KPa

CardioXP Operation Manual

Dimensions	300(W) x 299(H) x 123(D) mm , Approx. 4 kg
Standard Accessory	Patient signal module(1 EA), Patient cable[11 Pin](1 EA), Data cable[8 Pin](1 EA), AC Power cord (1 EA), Limbs electrodes(1 SET), Chest electrodes(1 SET), ECG chart paper(1 EA), Operation manual & ECG diagnosis guide (1 EA)
Options	Rechargeable battery(1 EA), Patient signal module cradle(1 EA), Wireless package[Pack & Dongle](1SET), Wall mount package(Panel & Guide bar)(1 SET), Disposable electrodes(1 SET), PC Software CD(1 EA), LAN Cable [Ethernet-RJ-45](1 EA), Cart(1 EA), Hanger(1 EA)
Wireless	Power : 3.3V Operating temperature: -20 ~ 70°C Transmission frequency : 2400MHz ~ 2483.5MHz Communication : Bluetooth V 1.2 compliant

WARRANTY

Product Name	Electrocardiograph
Model Name	Cardio XP
License Number	
License Date	
Serial Number	
Warranty period	1 year from the date of purchase
Date of purchase	(yyyy/mm/dd)
Customer	Hospital: Address: Name: Contact No:
Seller's Name	
Manufacturer's Name	

- ※Thanks for purchasing Cardio XP.
- ※This product is a medical machine.
- ※This product meets the strict quality requirements thoroughly.
- ※The repairing and compensation standards follow the consumer damage compensation regulations of the Ministry of Finance and Economy.

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Bionet Co., Ltd
Model Name: CardioXP