INFINIUM

QRS-12

Operators Manual
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Infinium Medical Inc. will make continuous improvement in features and functions for future publication of new equipment without prior notice. We beg your pardon for the inconvenience, if any.

Version

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P/N No.: 24000348

Release date: December 2013

Responsibility of the manufacturer

Infinium Medical Inc. only considers itself responsible for any effects on safety, reliability and performance of the equipment if:

Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by personnel authorized by us, and the electrical installation of the relevant room complies with safety standards.

NOTE:

◆ This device is not intended for home use.

WARNING:

◆ This device is not intended for treatment.
Label guide

⚠️WARNING⚠️

A WARNING label advises against certain actions or situations that could result in personal injury or death.

⚠️NOTE⚠️

A NOTE label advises against certain actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.
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Chapter 1 Safety Guidance

1.1 Safety Information

QRS-12 digital twelve channel electrocardiograph (ECG) complies with international standard IEC 60601-1, Medical Electrical Equipment: General Requirements for Safety and IEC 60601-2-25, Particular Requirements for Safety of Electrocardiographs. The classification is Class I, type CF, which means a higher degree of protection against electric shock and the patient connection is fully isolated and defibrillation protected.

QRS-12 is not explosion-proof. Do not use it in the presence of flammable anesthetics.

QRS-12 is designed for continuous operation but it is not drip-proof or splash-proof.

Safety classification is listed as below Table 1-1.

<table>
<thead>
<tr>
<th>Anti-electric-shock type:</th>
<th>Class I with internal power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-electric-shock degree:</td>
<td>CF</td>
</tr>
<tr>
<td>Degree of protection against harmful ingress of water:</td>
<td>Ordinary equipment (Sealed equipment without liquid proof)</td>
</tr>
<tr>
<td>Disinfection/sterilization method:</td>
<td>Refer to the <em>Operation Manual</em> for details</td>
</tr>
<tr>
<td>Degree of safety of application in the presence of flammable gas:</td>
<td>Equipment not suitable for use in the presence of flammable gas</td>
</tr>
<tr>
<td>Working Mode:</td>
<td>Continuous operation</td>
</tr>
<tr>
<td>EMC:</td>
<td>Group I, Class B</td>
</tr>
</tbody>
</table>

Table 1-1 Safety Classification

1.1.1 Environment Requirements

Please find in Table 1-2 for environment requirements of transportation, storage and working condition of QRS-12.

<table>
<thead>
<tr>
<th></th>
<th>Transportation</th>
<th>Storage</th>
<th>Working</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-20°C～+55°C</td>
<td>-10°C～+40°C</td>
<td>+5°C～+40°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>25%~95%</td>
<td>25%~85%</td>
<td>25%~85%</td>
</tr>
<tr>
<td>Atmosphere Pressure</td>
<td>700hPa~1060 hPa</td>
<td>700hPa~1060 hPa</td>
<td>700hPa~1060 hPa</td>
</tr>
</tbody>
</table>

Table 1-2 Environment Requirements

The transportation condition must be as stated by the contract. The ECG must be stored in the place which need meet the following requirements: the temperature being -10°C～+40°C, the relative humidity being ≤85%, there being no corrosive gases and it being well-ventilated.

Be sure that the operation environment is clean, and the ECG is kept away from corrosive, high humidity, high temperature or direct sunshine. Avoid shaking during operating and do not move the equipment when it is power on.
1.1.2 Power Supply

1) AC Power Supply
   - Rated voltage: 100V-240V
   - Rated frequency: 50Hz/60 Hz
   - Rated power: 75VA

2) DC Power Supply
   - Rated output voltage: 19V
   - Rated output current: 3.5A

3) Built-in Lithium Rechargeable Battery
   - Rated voltage: 14.4V
   - Rated capacity: 4400mAh

4) Fuse: T2A/AC250V Ø5×20

1.2 Warnings and Notes

In order to use the ECG safely and effectively, avoid possible dangers caused by improper operations, please read through the *Operation Manual* and be sure to be familiar with all functions of the equipment and proper operation procedures before use.

Please pay more attention to the following warning and note information.

1.2.1 Safety Warnings

⚠️ WARNING ⚠️:

- Infinium Medical Inc. ECG is provided for the use of qualified physicians or personnel professionally trained. The operator is supposed to be familiar with the contents of this *Operation Manual* before operation.
- Only qualified service engineer can install the ECG. And only service engineer authorized by Infinium Medical Inc. can open the shell.
- Only qualified installation or service engineer can shift the mains shift switch (100V-240V) according to local mains supply.
- The results given by the equipment should be examined with respect to the overall clinical condition of the patient. And it can not substitute for regular checking.

⚠️ WARNING ⚠️:

- **EXPLOSION HAZARD** - Do not use the ECG in the presence of flammable anesthetic mixture with oxygen or other flammable agents.
- **SHOCK HAZARD** - The power receptacle must be a hospital grade grounded outlet. Never try to adapt the three-prong plug to fit a two-slot outlet.
- If the integrity of external protective conductor in installation or arrangement is in doubt, the equipment should be operated from the built-in rechargeable battery.
- Do not use this equipment in the presence of high static electricity or high voltage equipment which may generate sparks.
- This equipment is not designed for internal use and direct cardiac application.
**WARNING**: 
- Only patient cable and other accessories supplied by Infinium Medical Inc. can be used. Otherwise the performance or electric shock protection can not be guaranteed.
- Be sure that all electrodes have been connected to the patient properly before operation.
- Be sure that the conductive parts of the electrodes and associated connectors, including neutral electrode, should not contact with earth or any other conducting objects.
- There is no danger for patients with pacemaker.
- Do not touch the patient, bed, table or the ECG while using defibrillator or pacemaker simultaneously.
- Before defibrillating, make sure the patient is completely isolated and avoid touching any metal part of the ECG in case of electric shock.
- Before defibrillating, remove all electrodes, gel or cloth pieces from the patient in case of any possible burnt.
- Apply patient cable appointed by the manufacturer only. Otherwise there might be electric burnt of the patient or damage of the ECG.
- Electrodes with defibrillator protection should be applied. To avoid any possible electric burn, it is recommended that only the patient cable and electrodes supplied by the manufacturer to be applied while defibrillating.
- In order to avoid burning, please keep the electrode far away from the radio knife while using electrosurgical equipment simultaneously.

**WARNING**: 
- Auxiliary equipment connected to the analog and digital interfaces must be certified according to IEC standards (e.g. IEC 60950 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of IEC 60601-1. If in doubt, consult our technical service department or your local distributor.
- The summation of leakage current should never exceed leakage current limits while several other units are used at the same time.
- The potential equalization conductor can be connected to that of other equipment when necessary. Make sure the equipment is connected with potential equalization bus bar of the electrical installation.

### 1.2.2 Battery Care Warnings

**WARNING**: 
- Improper operation may cause the battery to be hot, ignited or exploded, and it may lead to the declination of battery’s capacity. It is necessary to read the *Operation Manual* carefully and pay more attention to warning messages.
- Opening the battery cover, disassembling or replacing battery should be done according to the *Operation Manual*, and only battery of same model and specification provided by manufacturer should be used.
- **Danger of explosion** - Do not reverse the anode and cathode when connecting the battery.
Chapter 1 Safety Guidance

- Do not use battery around fire or place over 60°C. Do not heat or splash the battery. Do not throw it into fire or water.
- When leakage or foul smell found, stop using the battery immediately. If your skin or cloth comes into contact with the leakage liquid, cleanse it with clean water at once. If the leakage liquid splashes into your eyes, do not wipe them. Irrigate them with clean water first and go to see a doctor immediately.
- When the battery’s useful life is over or any abnormal phenomenon is found from the battery, stop using it, and contact with the manufacturer or local distributor for disposal or dispose the battery according to local regulations.

1.2.3 General Notes

**NOTE**: Avoid liquid splash and excessive temperature. The temperature must be kept between 5°C to 40°C while working, and between -20°C to 55°C during transportation, and between -10°C to 40°C during storage.

- Do not use the ECG in dusty environment with poor ventilation or in the presence of corrosive.
- Be sure that there is no intense electromagnetic interference source around the equipment, such as radio transmitter or mobile phone etc. 
  **Attention**: large medical electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment etc. are likely to bring electromagnetic interference.

**NOTE**: Check the main unit and its accessories carefully before operating the ECG. Replacement should be taken if there is any evident defectiveness or aging symptom which may impair the safety or performance.

- Fuses must only be replaced with the same type and rating as the original.
- The equipment and reusable accessories can be sent back to the manufacturer for recycling or proper disposal after their useful lives.

1.2.4 Cleaning & Disinfection Notes

**NOTE**: Turn off the power before cleaning and disinfection. If mains supply used, the power cord should be drugged out of the outlet also. Prevent the detergent from seeping into the equipment.

- Do not immerse the unit or patient cable into liquid under any circumstances.
- Do not clean the unit and accessories with abrasive fabric and avoid scratching the electrodes.
- Any remainder of detergent should be removed from the unit and patient cable after cleaning.
- Do not use chloric disinfectant such as chloride and sodium hypochlorite etc.
- Do not use high temperature, autoclaving or radiation sterilization processes.
1.2.5 Electro Magnetic Compatibility Information

The equipment must comply with IEC 60601-1-2 for medical electronic equipment or EMC standards. The electromagnetic environment which exceeds the limits of the IEC 60601-1-2 standard will generate harmful interference or degrade the performance. Please exclude adverse electromagnetic interference before using.

Common sources of interference and solutions:
1. Strong electromagnetic interference generated by the nearby emissive sources, such as: broadcasting station, transformer substation and cell phone.
   Solution: Keep the equipment away from the emissive sources.
2. RF interference generated by other equipment or system through electric knife line.
   Solution: Determine the causes of interference and remove possible ones. If not, please change the power supply.
3. Direct and indirect influence from electrostatic discharge.
   Solution: Make sure that all equipments and systems have no direct or indirect electrostatic energy before use. Humidor room can effectively reduce such interference.
4. Electromagnetic interference generated by radio receiver such as TV and radio.
   Solution: Try to keep this equipment away from the radio receiver.

If these methods cannot solve the problem, please connect us or the designated maintenance points.
Chapter 2 Introduction

QRS-12 digital 12-channel physiological function measurement equipment which records the heart waveform during electro-biological movement. It provides sufficient information on the analysis of arrhythmia and cardiovascular disease, helps to know the pathological disorder caused by some drugs and electrolyte, or unbalance of PH value. It is important equipment for cardiac disease examination, and its compact size makes it suitable for use while visiting patients at home.

**Standard Configuration:** main unit and accessories, including patient cable, chest electrodes, limb electrodes, thermo-sensitive print paper and power cord etc.

**Intended use:** The cardiogram and heart rate recorded by the ECG can help doctors to analyze and diagnose heart disease or arrhythmia in hospitals. Its compact size makes it suitable for use while visiting patients at home.

⚠️ **NOTE:**
- The patient who has a heart disease may have a normal electrocardiogram, so other tests are required for a full heart appraisal. This equipment cannot be connected to the heart directly.

### 2.1 Function Features

QRS-12 has following features:

- 7” high brightness TFT screen, real-time display of 12 channel ECG waveforms
- Modern in design, easy for carry
- Light-touch numeric/letter keys contribute to easy and convenient operation
- Touch screen operation
- Simultaneously acquisition of 12-lead ensures reliable data for clinical diagnosis
- Real-time age-analyze software package produces accurate analysis report
- Application of digital signal processing technique which can effectively restrict the interference caused by baseline drift, HUM, or EMG when measuring heart rate
- ECG measurement and analysis function reduces doctor’s work strain
- Pre-10-second printing function helps the doctor to print out any abnormal ECG waveform
- Three kinds of operation modes: AUTO, MAN, RR ANA. 5 manual print types: 12x1, 6Tx2, 6x2+1rhy, 3x4+3rhy, Test Mode; 8 manual print types: 12x1, 12x1+P, 6Tx2, 6x2+1rhy, 6x2+1rhy+P, 3x4+3rhy, 3x4+1rhy+P and template +P
- Sampling mode: real-time sample, pre-sample, period sample and trigger sample
- It can connect with laser printer, bar code scanner, magnetic card reader
- It has freeze, print preview and waveforms recall function.
- Clinical information: Patient ID, gender, age, height, weight, technician, doctor, race, bed number, room, blood pressure and hospital information can be edited easily.
To observe abnormal heartbeat from rhythm lead

Built-in ECG simulator

AC (50/60Hz) and battery dual power supply, aptitude protection circuit of over load or over voltage

High resolution thermal dot-matrix printing system which produces clear and accurate printout of waveforms and characters

Automatic adjustment of baseline for optimal recording

Built-in Help Function: electrode positioning, ECG basic knowledge, common trouble-shooting and so on

180 ECG files can be saved in the ECG, up to 10000 ECG files can be stored in U disk

Neat saving interface. Saved ECG files can be displayed in image-text or list format, easy for search

Auto-save function: after printing, the printed ECG file will be automatically saved

2.2 List of Symbols

Symbols in this *Operation Manual* are listed as below Table 2-2.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄</td>
<td>External output</td>
<td>🔄</td>
<td>External input</td>
</tr>
<tr>
<td>🎀</td>
<td>Equipment or part of CF type with defibrillator proof</td>
<td>🚨</td>
<td>Attention – general warning(see accompanying document)</td>
</tr>
<tr>
<td>⬇️</td>
<td>Equipotentiality</td>
<td>⬇️</td>
<td>Mains supply</td>
</tr>
<tr>
<td>📈</td>
<td>Contrast adjustment</td>
<td>📈</td>
<td>Battery recharging indicator</td>
</tr>
</tbody>
</table>

Table 2-1 List of Symbols
3.1 Front Panel

3.1.1 Product Information:

1) LOGO

2) Model Series
   QRS-12

3) Classification Symbol
   ![Classification Symbol]
   Equipment of CF type with defibrillator proof

4) Open Button
   Push this button to open the recorder cover. See Chapter 4.2 for details

5) Hidden handle
   When necessary, the handle can be pulled out for carrying the machine.
3.1.2 LCD Screen

The display of QRS-12 is 7 inch color LCD, 800*480 dip.

![LCD Display of QRS-12](image)

Figure 3-2 LCD Display of QRS-12

Normally, the contents displayed in the LCD screen include (from left to right):

**Top Row:**
- Name (20 letters or 10 characters)
- Patient ID (10 digits can be input)
- Gender (Male/Female/Empty)
- Weight Kg (000-999)
- Age Y (000-999)
- Blood pressure mmHg (000-999, can input systolic and diastolic)
- Height cm (000-999)
- Operation status: DEMO, sampling, analyzing and printing
- Hint information: Freeze, Lead off or blank
- Heart rate (Actual heart rate, the refreshing speed of the dynamic icon is the same as the heart beating speed)
- Current date & time (YYYY/MM/DD; HH:MM:SS)

**Bottom Row:**
- Mode (AUTO, MAN, ANA)
Chapter 3 General Information

- **AC Filter** (AC OFF, AC 50Hz, AC 60Hz), AC 50Hz and AC 60Hz must be selected in the system setting.

- **EMG Filter** (EMG OFF, EMG 25Hz, EMG 35Hz, 45Hz)

- **ADS Filter** (OFF, 0.05Hz, 0.15Hz, 0.25, 0.32Hz, 0.5Hz, 0.67Hz, it can be selectable in Filter setup)

- **Sensitivity** (Auto, 2.5, 5, 10, 20, 40mm/mV)

- **Paper Speed**: 25mm/s, 50mm/s (other speed can be set in Print setup)

- **Print Type**: 12x1, 12x1+P, 6Tx2, 6x2+1rhy, 6x2+1rhy+P, 3x4+3rhy, 3x4+3rhy+P, Template+ P

- **Page down**

- **Status of power source**

- **Network Connection Status** (LAN)


- **Page up**

**Right-hand Column (from top to bottom):**

- **Help** (basic knowledge of how to operate the ECG)

- **Info** (to edit the patient information)

- **File** (to save or open up the patient data and edit the hospital information)

- **Freeze**

- **Recall**

- **Menu** (to set up different parameters)

3.1.3 Control Panel and Keys

![Control Panel of QRS-12](image)

Figure 3-3 Control Panel of QRS-12
1) Indicator Lamp

- Mains supply indicator lamp: when mains supply is used, the lamp is on.
- Battery recharging indicator lamp: when the battery is recharged, this lamp flashes.
  
  When the battery is full charged, this lamp will be off.

2) MODE/F1

Press this key to select operation mode between AUTO, MAN, and ANA. The switching order of leads is listed in Table 3-1.

When inputting patient name or hospital name, press this key to change between capital and small letters. In FILE menu, press this key to change between image-text and list modes.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Switching Order (from left to right)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO (Standard)</td>
<td>I    II   III aVR aVL aVF V1 V2 V3 V4 V5 V6</td>
</tr>
<tr>
<td>AUTO (Cabrera)</td>
<td>aVL  I   aVR II aVF III V1 V2 V3 V4 V5 V6</td>
</tr>
<tr>
<td>MAN</td>
<td>In this mode, you need to press Lead (F4/F5) Key to change the lead. For the lead switching order, refer to that of AUTO (Standard) or AUTO (Cabrera) above, which can be set in the Basic submenu. The Test mode is used for manufacturer to test the print head and the paper shift.</td>
</tr>
<tr>
<td>ANA</td>
<td>After around 1 minute of self-sampling, the compressed lead of any one of the above 12 leads waveform, report and its R-R histogram will be printed out.</td>
</tr>
</tbody>
</table>

Table 3-1 Switching order of Leads

3) RESET/F2

Press RUN/STOP to start recording, then press RESET to reset signal lead. After that, the corresponding wave is a line. The locked lead will unlock itself after 0.4 second. The ECG signal will have interference and press RESET to reset the signal, if the equipment is connected with a defibrillator.

It is also a direction key upward to be used to choose the items and page turning.

4) 1mV/F3

Under MAN mode, press this key to record a 1mV calibration pulse at any time while recording.

It is also a direction key downward to be used to choose the items and page turning.
Chapter 3 General Information

5) LEAD (Lead Switch Keys)/F4, F5

Under AUTO mode, press the keys to switch the lead group. They’re also direction keys leftward or rightward in time editing, FILE, INFO interface.

6) MENU/F6

Press this key to enter MENU interface, press it again to exist.

7) ON/OFF

Power on or off the ECG. When the ECG is not printing it can be powered off. However we strongly recommend the ECG is powered off in main interface.

8) RUN/STOP

Start or stop recording.

9) HELP/Del

Press this key to read helpful information such as electrode positioning, ECG basic knowledge, etc. Press this key again to turn back to main menu. In “INFO” interface, it can be used to delete input information.

10) FILE

Press this key to enter “FILE” interface. Press it again to return to main menu.

11) INFO

Press this key to input patient ID, name, sex, age, height, weight, and blood pressure, etc. If it’s not under main menu, it has the same function like “Tab” of the PC keyboard.

12) SPEED

Choose required printing speed from 25mm/s, 12.5mm/s, 10mm/s, 6.25mm/s, 5mm/s or 50mm/s.
In FILE and HELP interface, this is a PageUp key.

13) SENS

Choose required sensitivity from AUTO, X2.5mm/mV, x5mm/mV, x10mm/mV, x20mm/mV, or x40mm/mV.
In FILE and HELP interface, this is a PageDown key.

14) Enter

In main interface, press this key to print pre-10-second ECG data, and press “RUN/STOP” to stop printing;
In MENU interface, press this key to confirm;

15) Numeric/letter keys

These keys are numeric symbols.
In FILE or INFO interface, press these keys to input patient name, hospital name, patient ID, age, height, weight, blood pressure.

Tips:
1. In MENU interface, efficiency can be improved by directly pressing the numeric key;
2. Press MENU, INFO, FILE to enter the desired interface, no need to retreat the current interface;
Quickly press MENU, INFO, or FILE key again to return to main interface;

3.2 Mains Connection and Switch

![Figure 3-4 Mains Connection and Switch]

1) AC Power Switch
   - : Power on
   - : Power off
2) AC Power Socket
The equipment is well grounded when connected to a 3-phase power supply.

3) Equipotentiality

⚠️ **NOTE**: When used with other medical equipment, connect the equipotentiality of the ECG to the grounding ends of the equipment with the grounding cable provided, to protect patients from any possible electric shock caused by other equipment.

⚠️ **NOTE**: Connect one end of the grounding cable to the equipotentiality of the equipment and connect the other end to the ground to enhance reliability of grounding. Do not use pipe or the like as grounding cable, otherwise, the grounding cannot work and the patient has potential risk of electric shock.

4) DC Power Socket
Infinium Medical Inc. ECG can be powered by external DC power source. When choosing DC power source, be sure that the output voltage and current meet the equipment requirement and the interface matches. Car DC power source and the like can be used.

⚠️ **WARNING**: Be sure that the safety specification of the DC power source meets the requirement of valid version of IEC 60601-1.

### 3.3 Patient Cable Socket and Signal Interface

![Figure 3-5 Interfaces](image)

⚠️ **WARNING**: Auxiliary equipment connected to the analog and digital interfaces must be certified according to IEC standards (e.g. IEC60950 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of IEC 60601-1. Therefore anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC 60601-1. If in doubt, consult our technical service.
department or your local distributor.

- Total current leakage should not exceed current leakage limit while several other units are used at the same time.

1) Patient Cable Socket

![Patient Cable Socket Diagram]

- Applied part of type CF with defibrillator proof.

Definition of corresponding pins:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C2 (input)</td>
<td>6</td>
<td>SH</td>
<td>11</td>
<td>F (input)</td>
</tr>
<tr>
<td>2</td>
<td>C3 (input)</td>
<td>7</td>
<td>NC</td>
<td>12</td>
<td>Cl (input)</td>
</tr>
<tr>
<td>3</td>
<td>C4 (input)</td>
<td>8</td>
<td>NC</td>
<td>13</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>C5 (input)</td>
<td>9</td>
<td>R (input)</td>
<td>14</td>
<td>RF</td>
</tr>
<tr>
<td>5</td>
<td>C6 (input)</td>
<td>10</td>
<td>L (input)</td>
<td>15</td>
<td>NC</td>
</tr>
</tbody>
</table>

Table 3-2 Patient Cable Definition of Pins

2) RS232 Socket

⚠️ WARNING ⚠️:

- The dielectric strength of RS232 interface is AC 1500V, therefore the maximum DC voltage applied on the interface can not exceed +12V.

![RS232 Socket Diagram]

Definition of corresponding pins:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EXT/OUT</td>
<td>4</td>
<td>NC</td>
<td>7</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>RxD (input)</td>
<td>5</td>
<td>GND</td>
<td>8</td>
<td>NC</td>
</tr>
<tr>
<td>3</td>
<td>TxD (output)</td>
<td>6</td>
<td>NC</td>
<td>9</td>
<td>EXT/IN</td>
</tr>
</tbody>
</table>

Table 3-3 RS232 Definition of Pins

After the ECG Workstation Software is installed in PC, ECG data can be transferred to the PC via RS232 interface for display and management.

3) USB Interface

After USB device plug in this interface, ECG data can be transferred to USB flash via USB interface.
What’s more, laser printer, bar code scanner and magnetic card reader can be plugged in to realize its own functions.

⚠️ WARNING ⚠️

The laser printer should be connected to power source first, after its initialization is down, then connect to ECG, or the laser printer will not work.

**HP Printer setup flow:**
- Power on  → select 【service】 → select 【USB speed】 → select 【Full】
- back to 【service】 → select 【HP Smart Install】 → select 【Off】
- connect ECG and print

4) LAN interface
LAN interface can be used as communication port between ECG and workstation, and upload the ECG files to workstation directly. If you choose LAN interface to be the communication port, please set the IP, subnet mask, etc, according to PCECG-500 operation manual.

3.4 Bottom Panel

![Bottom Panel](image)

1) Fuse label

![Fuse Label](image)

⚠️ WARNING ⚠️:
- Fuse must only be replaced with the same type and rating as the original one.

2) Battery Compartment
The battery label indicates the rated voltage and rated capacity of rechargeable lithium battery pack. Rated voltage: 14.4V, Rated capacity: 4400mAh.

**WARNING**:  
- Improper operation may cause the battery hot, ignited or exploded, and it may lead to the decrease of battery capacity. Therefore, it is necessary to read the *Operation Manual* carefully and pay more attention to warning messages.

**WARNING**:  
- When leakage or foul smell found, stop using the battery immediately. If the leakage liquid gets to your skin or cloth, cleanse it with clean water at once. If the leakage liquid gets into your eyes, do not wipe them. Irrigate them with clean water first and go to see a doctor immediately.

**WARNING**:  
- Opening the battery cover, disassembling or replacing battery should be done according to the *Operation Manual*, and only battery of same model and specification provided by the manufacturer should be used.

3) Product Label  
In the label, there is information of product model, S/N, manufacture date, register No., manufacturer name, etc.
Chapter 4 Operation Preparations

⚠️ WARNING ⚠️:
- Check the main unit and its accessories carefully before operating the ECG. Replacement should be taken if there is any evident defectiveness or aging symptom which may impair the safety or performance. Make sure that the equipment is in proper working condition.

4.1 Connecting to AC Power and Grounding

⚠️ WARNING ⚠️:
- To avoid any possible electric shock, please connect the ECG with AC power by a three-phase power cable. Don’t open the ECG while it is powered on.

⚠️ WARNING ⚠️:
- If the integrity of external protective conductor in installation or arrangement is in doubt, the ECG should be operated from the built-in rechargeable battery.

We ECG can be powered on by AC power supply, DC power supply or built-in rechargeable lithium battery pack.

1) AC Power Supply
   The mains socket is on the left upper side of the ECG. Properly connect the ECG with mains supply.
   Rated voltage: 100V-240V
   Rated frequency: 50Hz/60Hz
   Rated input power: 75VA
   Make sure the AC power supply meets the above requirements before power on. Then press the AC power switch to turn on the ECG. The AC power supply indicator lamp (√) will be lit.

2) Built-in Rechargeable Battery
   The built-in rechargeable battery pack is used, because of the consumption during storage and transport, the capacity of battery may not be full. In this case please recharge the battery first. Replace the battery when the battery has been recharged over 500 times.

⚠️ NOTE ⚠️:
- The battery is put into the battery compartment without connecting to the battery socket at factory. After receiving the ECG, if built-in rechargeable battery is to be used, connect the battery to the socket first.
- Please refer to the Section 8.4.1 for how to recharge the battery. During recharging, the ECG can be powered on by AC power supply and continue operating.
- The battery should be recharged at least 8 hours for first time application.
- The battery’s recycling life is about 500 times of recharging.

3) External DC Power Supply
   Make sure the DC power supply meets the requirements as below:
   Rated output voltage: 19V;
Chapter 3 General Information

Rated output current: 3.5A;
Output terminal plug must match the DC socket in the ECG.

4) Equipotentiality terminal
When used with other medical equipment, connect the equipotentiality of the ECG to the
grounding ends of these equipment with the grounding cable enclosed to protect patient from
electric shock in case any possible current leakage of other equipment.

5) Power on the equipment
Switch on AC power and press ON/OFF key to power on the equipment. Or just press ON/OFF to
power on the equipment when using battery.

4.2 Loading Recording Paper
216mm/210mm width roll thermal sensitive paper can be applied to QRS-12(Class M) as recording
paper. There will be both audio and video alarms when there is no paper or the paper is not properly
installed.

Figure 4-1 Loading Roll Paper
Loading Procedures of Rolled Paper:
1. Push the Open Button to open the paper compartment cover.
2. Take out the paper rollers, remove remaining paper if necessary. Insert the rollers into the new roll paper and put the paper with rollers back into the paper compartment. Be sure that the paper is installed with the paper’s grid side facing downward.
3. Pull about 2 cm of the paper out, and close the cover gently.

**NOTE**: Print record before the press "INST" key to reset and wait until stable and then print the ECG information.

4.3 Patient Cable Connection

Patient cable includes two parts, main cable and lead wires with associated electrode connectors. The electrode connectors can be distinguished from the color and identifier on them.

![Patient Cable](image)

- **Connect Main Cable:** Plug the connector of main cable into the patient cable socket on the right side of the ECG. Secure the knobs on sides of the socket.

  **WARNING**: This product is CF classified and defibrillation protected only when the original patient cable is used. However, as a safety precaution when possible, remove electrodes before defibrillation. It is strongly recommended that only Infinium Medical Inc. patient cable be used when the ECG is using with high frequency devices to avoid any possible signal interference.

4.4 Electrodes Connection

- **Chest Electrode:**
The identifier and color code of electrodes used comply with IEC requirements. In order to avoid incorrect connections, the electrode identifier and color code are specified in Table 4-1. The equivalent code of American standard is given too.

<table>
<thead>
<tr>
<th>Electrodes</th>
<th>European Identifier</th>
<th>Color code</th>
<th>American Identifier</th>
<th>Color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right arm</td>
<td>R</td>
<td>Red</td>
<td>RA</td>
<td>White</td>
</tr>
<tr>
<td>Left arm</td>
<td>L</td>
<td>Yellow</td>
<td>LA</td>
<td>Black</td>
</tr>
<tr>
<td>Right leg</td>
<td>RF</td>
<td>Black</td>
<td>RL</td>
<td>Green</td>
</tr>
<tr>
<td>Left leg</td>
<td>F</td>
<td>Green</td>
<td>LL</td>
<td>Red</td>
</tr>
<tr>
<td>Chest 1</td>
<td>C1</td>
<td>White/red</td>
<td>V1</td>
<td>Brown/red</td>
</tr>
<tr>
<td>Chest 2</td>
<td>C2</td>
<td>White/yellow</td>
<td>V2</td>
<td>Brown/yellow</td>
</tr>
<tr>
<td>Chest 3</td>
<td>C3</td>
<td>White/green</td>
<td>V3</td>
<td>Brown/green</td>
</tr>
<tr>
<td>Chest 4</td>
<td>C4</td>
<td>White/brown</td>
<td>V4</td>
<td>Brown/Blue</td>
</tr>
<tr>
<td>Chest 5</td>
<td>C5</td>
<td>White/black</td>
<td>V5</td>
<td>Brown/orange</td>
</tr>
<tr>
<td>Chest 6</td>
<td>C6</td>
<td>White/violet</td>
<td>V6</td>
<td>Brown/violet</td>
</tr>
</tbody>
</table>

Table 4-1 Electrodes, Identifier and Color Code

The chest electrode should be placed on body surface as shown below.
C1: Fourth intercostals space at right border of sternum
C2: Fourth intercostals space at left border of sternum
C3: Fifth rib between C2 and C4
C4: Fifth intercostals space on left midclavicular line
C5: Left anterior auxiliary line at the horizontal level of C4
C6: Left midaxillary line at the horizontal level of C4

The contacting resistance between the patient and the electrode will affect the quality of ECG waveform greatly. In order to get a high-quality ECG waveform, the skin/electrode resistance must be minimized while connecting electrodes.

**Chest Electrodes Connection:**
1. Ensure the electrodes are clean;
2. Align all lead wires of patient cable to avoid twisting, and connect the associated electrode connectors with corresponding electrodes according to the color and identifier;
3. Clean electrode area on chest surface with alcohol;
4. Daub the round area of 25mm diameter on each electrode site with gel evenly;
5. Place a small mount of gel on the brim of chest electrode’s metal cup;
6. Place the electrode on chest electrode site and squeeze the suction bulb. Unclench it and then the electrode is adsorbed on chest. Attach all chest electrodes in the same way.

**Limb Electrodes Connection:**
1. Ensure the electrodes are clean;
2. Align lead wires of patient cable to avoid twisting, and connect the electrode connectors to corresponding electrodes according to the color and identifier;
3. Clean electrode area on a short distance above the ankle or wrist with alcohol;
4. Daub the electrode area on limb with gel evenly;
5. Place a small amount of gel on the metal part of limb electrode clamp;
6. Connect the electrode to limb, and be sure that the metal part be placed on the electrode area above the ankle or wrist. Attach all limb electrodes in the same way.
**WARNING:**

- Be sure that all electrodes have been connected to the patient correctly before operation.
- Be sure that the conductive parts of electrodes and associated connectors, including neutral electrode, should not contact with earth or any other conducting objects.
- There is no danger when using the ECG with electrical stimulation equipment. However, the stimulation units should only be used at a sufficient distance from the electrodes. If in doubt, the patient should be disconnected from the device.
- Electrodes with defibrillator protection should be used while defibrillating.
- Do not touch the ECG Shell case during defibrillation.

### 4.5 Inspection before Startup

In order to avoid safety hazards and get good ECG record, the following inspection procedures are recommended before turning on the ECG and beginning operation.

1) Environment:

- Check and make sure that there is no electromagnetic interference source around the equipment, especially large medical electrical equipment such as electrosurgical equipment, radiological equipment and magnetic resonance imaging equipment etc. Switch off these devices when necessary.
- Keep the examination room warm to avoid muscle action voltages in ECG signal caused by cold.
2) **Power Supply:**
- If mains power used, please check whether the power cord has been connected to the ECG and it is properly grounded.
- Recharge the battery first before use when the battery capacity is low.

3) **Grounding:**
- Check the grounding cable is properly connected.

4) **Patient Cable:**
- Check whether the patient cable has been connected to the ECG firmly, and keep it far away from the power cord.

5) **Electrodes:**
- Check whether all electrodes have been connected with lead wires of patient cable correctly according to the identifier and color.
- Be sure that all electrodes have been connected to the patient correctly.
- Ensure that the chest electrodes haven’t contacted with each other.

6) **Recorder Paper:**
- Ensure that there is enough recording paper loaded.
- Make sure the case of the recorder has been secured.

7) **Patient:**
- The patient should not contact with conducting object such as earth, and metal part of bed etc.
- Ensure the patient is warm and relaxed, and breathe calmly.

8) **AC Filter Frequency**
- Check the setup of AC Filter Frequency and make sure is identical with the local regulations, or it will influence the anti-jamming effect.

⚠️ **WARNING:**
- The ECG is provided for the use of qualified physicians or personnel professionally trained. The operator is supposed to be familiar with the contents of this *Operation Manual* before use.
Chapter 5 Operation Instructions

Basic operation procedures

- Install recording paper
- Connect patient cable to ECG
- Connect AC power cable and turn on the ECG
- Clean patient skin with alcohol where electrodes will be positioned
- Connect all electrodes
- Press F2 reset key twice to stabilize the ECG signal
- Press “RUN/STOP” or REVIEW key to start or stop printing

**NOTE**: 
- The battery is put into the battery compartment without connecting to the battery socket at factory. After receiving the ECG machine, connect the battery to the socket first.
- The side with grid faced down when loading the print paper.
- Lead wires and electrodes provided by manufacturer should be used.
- Replace the electrode after cleaning the surface with alcohol, when there is alarm information for lead off.
- Do not plug the electrodes off when doing the ECG analysis.

5.1 Power ON/OFF

5.1.1 Power ON

- When AC power supply is applied, press the power switch, and the AC power supply indicator (✓) is lit. Press ON/OFF key for about three seconds on the control panel to turn on the equipment. Such information as name, manufacturer and version No. etc., will be displayed in LCD screen after self-test. Then the ECG is ready for examination and recording.
- When external DC power supply is applied, both the two indicator lamps will be constant lit. Press ON/OFF key for about three seconds on the control panel to turn on the equipment. Such information as name, manufacturer and version No. etc., will be displayed in LCD screen after self-test. Then the ECG is ready for examination and recording.
- When using built-in rechargeable lithium battery, press ON/OFF key for about three seconds on
Chapter 5 Operation Instructions

the control panel directly to turn on the ECG, and then the AC power supply indicator and the battery indicator are not bright. Equipment information such as name, manufacturer and version No. etc., will be displayed on LCD screen after self-test. The ECG is ready for examination and recording. When the battery symbol becomes “”, the battery is low, and the equipment will be automatically turned off in 1 minute. In this case, use AC power supply to continue operation and the battery will be simultaneously recharged.

5.1.2 Power OFF

➢ When battery is the power supply, continuously press ON/OFF key for about three seconds for 3 seconds to turn off the ECG.
➢ When AC is the power supply, press ON/OFF key for about three seconds to turn off the ECG, turn off the AC switch, plug out the AC power cable.
➢ When DC is the power supply, press ON/OFF key for about three seconds to turn off the ECG, then plug out the DC power cable.
➢ When battery is the power supply, the backlight will automatically turns off without operation within 30s. If there is no operation within 3 minutes, the ECG will turn off automatically. When AC power is applied, it will enter power-saving mode automatically if there is no operation within 3 minutes.

⚠️ NOTE ⚠️:

➢ The ECG can be turned off in any interface. However we’d recommend the ECG is turned off accordingly to the normal procedures in case there is any chaos in the screen when the ECG is powered on next time.

5.2 HELP

Press “HELP” or touch “Help” on the screen, and then enter HELP menu. After that, you’ll see the electrode position diagram, basic information about ECG, common trouble shooting and so on. Press “UP”, “DOWN”, “SPEED” and “SENS” to scroll the page. Press “ESC” or touch “X” to return to main interface. It has two languages for you to switch, i.e. English and Chinese.

5.3 Info
Press \[INFO\] /Tab key to input clinical information, including patient name, technician, drugs, doctor, Institution, ID, bed No., race, room, blood pressure, height, gender, age and weight. Press ‘\[left\]’ to save and confirm but press ‘ESC’ key or ‘X’ to turn back to main menu as Table 5-1. Press it again to return to main menu.

<table>
<thead>
<tr>
<th>Name</th>
<th>Patient’s Name (20 characters or 10 Chinese characters)</th>
<th>Race</th>
<th>Asians, White People, Black People, Pacific Island Residents and American Indians, unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drugs</td>
<td>20 characters or 10 Chinese characters</td>
<td>Weight(kg)</td>
<td>Patient’s Weight (3 digits)</td>
</tr>
<tr>
<td>BP (mmHg)</td>
<td>Patient’s systolic and diastolic pressure (000-999 digits)</td>
<td>Height (cm)</td>
<td>000-999 digits</td>
</tr>
<tr>
<td>Birthday</td>
<td>YYYY-MM-DD, MM-DD-YYYY, DD-MM-YYYY (data format chosen from “Date” of main menu)</td>
<td>Gender</td>
<td>Male/Female/Empty</td>
</tr>
<tr>
<td>ID</td>
<td>Patient’s ID (10 digits)</td>
<td>Age (Y)</td>
<td>Patient’s Age (3 digits)</td>
</tr>
<tr>
<td>Bed No.</td>
<td>10 digits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5-1


- Touch “↑” key on the keyboard of the touch screen to shift from small letter to capital letter. Press “TAB” key to the next blank in order. Touch “X” key on the keyboard of the touch screen.

5.4 File

- Search: click the blank frame to input searching information through soft keyboard, then touch the “Search” button.

1. This function mainly focuses on the storage and search for the patient information and ECG waveforms.

**Operation Method**: As the above Figure 5-3 and Figure 5-4 shows, from F1 to F6, there are 6 keys to select. And touch screen will be much easier for operation.

- **Search**: click the blank frame to input searching information through soft keyboard, then touch the “Search” button.
Chapter 5 Operation Instructions

◆ **Exit Search:** To return file interface.

◆ **Choose:** Press “SPEED” and “SENS” to move the cursor to the case you need, then touch the 【Choose】 on the left screen, then there is a “*” in the last column of the case, which indicates the case has been selected (touch the 【Choose】 again to cancel select). With this operation, you can select several cases, then touch the 【Bu.upload】 on the bottom of screen to upload.

Storage function setup(down in the interface, left to right):

◆ **USB:** Users can choose to save patient information in USB. ECG files will be automatically saved in internal flash, when printing.

◆ **Save On/Off:** When the equipment is in “save on” status, the case will be automatically saved in the flash after printing, or cases will not be saved.

◆ **Bu.Upload:** Upload cases selected to the PC

◆ **Upload All:** Upload all cases to the PC

◆ **Delete All:** Delete all cases

◆ ◄ Switch to next function page

◆ **Preview:** Preview case

◆ **Edit:** After enter the “File”, users can edit the patient information

◆ **To USB:** Export the selected case to the “ECGFILE” file of U disk

◆ **Upload:** Upload the selected case to the PC

◆ **Delete:** Delete the selected case in dark blue background

◆ ◄ Switch to previous function page

5.5 **Freeze**

In the main interface, press this key, it can freeze the waveforms; press this again, it returns to the real-time sampling mode.

5.6 **Recall**

Touch “Recall”, the previous print-out data will show; press ESC, then users can exit. It only functions after printing results under the AUTO and RR ANA mode.
Chapter 5 Operation Instructions

Figure 5-5 Recall Interface

1. Touch Recall key to enter the recall interface.

2. Press F1 key of the panel to print out this ECG waveform. Press the F4 key to exit. Press the F2 and F3 key to turn page up/down. Or you can operate by touch relative button on the bottom of the interface.

3. The recall function only works after finishing a report in auto mode.

5.7 Operation Menu

5.7.1 Menu

Figure 5-7 Menu Interface

Press MENU to enter the MENU interface. Press the Exit key of the menu interface to exit.
Chapter 5 Operation Instructions

There are 10 sub-menus under the MENU interface as the figure 5-7 shows, press the "SPEED", "SENS", "PgUp", "PgDn" and "Tab" key to choose the sub-menu you need to change, and press Enter key to make a confirmation. What’s more, you can also touch the screen to finish operation.

5.7.2 Set the Printing Parameters

![Print Setting Interface](image)

1. Choose the Print Setting after entering the menu, and press the ESC key to exit.

2. The print setting concludes following items: Paper Speed, Acquisition Mode, Auto Print Mode, Man. Print Mode and so on. Press the Menu or Enter key to set the chosen item, press "SPEED", "SENS", "PgUp", "PgDn" key to choose side to side, and press Tab to choose from top to bottom. Press the ESC key to exit and Press Enter to confirm.

Table 5-2

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed</td>
<td>5mm/s , 6.25mm/s , 10mm/s , 12.5mm/s , 25mm/s , 50mm/s</td>
</tr>
<tr>
<td>2</td>
<td>Print</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>3</td>
<td>Print Time</td>
<td>User enter manually (5~30s)</td>
</tr>
<tr>
<td>4</td>
<td>Paper Size</td>
<td>210mm/216mm</td>
</tr>
<tr>
<td>5</td>
<td>Time Marker</td>
<td>On/Off</td>
</tr>
<tr>
<td>6</td>
<td>Print Preview</td>
<td>On/Off</td>
</tr>
<tr>
<td>7</td>
<td>Print Device</td>
<td>Thermal, HP DJ1000, HP M401D. The default is thermal printer</td>
</tr>
<tr>
<td>8</td>
<td>Minnesota Code</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>9</td>
<td>Measure</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>10</td>
<td>Analysis</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>11</td>
<td>Template</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>12</td>
<td>R-R Time</td>
<td>60s, 180s</td>
</tr>
<tr>
<td>13</td>
<td>Period Interval</td>
<td>Users enter manually (1~60 minutes)</td>
</tr>
<tr>
<td>14</td>
<td>Print Duration</td>
<td>Users enter manually (1~60 minutes)</td>
</tr>
</tbody>
</table>

- Paper Speed: 25mm/s or 50mm/s is generally selected in clinical use. 5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s are for test purpose or special acquisition and ECG recall.
- Print: It has two options: On and Off. If you want to print the results, you must turn it on.
- Minnesota code: On or Off. If you turn it on, it will print Minnesota code on the printing results; otherwise, it won’t.
- HP Printer setup flow: Power on → select 【service】→ select 【USB speed】→ select 【Full】→ back to 【service】→ select 【HP Smart Install】→ select 【Off】→connect ECG and print

**NOTE**

The laser printer should be connected to power source first, after its initialization is down, then connect to ECG, or the laser printer will not work.

**Print Preview**

Under AUTO mode, if “Print Preview” turns on, press “RUN/STOP” to enter preview interface.
From left to right, it’s “Analysis Result”, “Print”, “Cancel”, “Up”, “Down”, “Play”, “Pause”, “Save” and “Exit”.

- Analysis result: Press “F1” or touch “Ana. Result” to enter analysis result preview interface. You can touch “Waveform”, “Print”, “Cancel” and “Exit” to fulfill the function.
- Print: Press “F2” or touch “Print” to print the current 10S ECG waveforms.
- Cancel: Press “F3” or touch “Cancel” to stop printing.
- Up/Down: Press “F4” or “F5” or touch “Up/Down” to scroll the pages.
- Play: Press “F6” or touch “Play” to replay the previous 120S waveforms. It will stop playing automatically after the 120s waveforms completely replayed.
- Pause: touch “Pause” to stop waveforms replay.
- Save: analyze and save the current sampling 10s ECG waveforms. The ECG files will be read from the “FILE” interface, only when the SAVE in the “FILE” interface is on.
- Exit: Press <ESC> to exit freeze interface.

Table 5-3 13 arrhythmia

<table>
<thead>
<tr>
<th>Arrhythmia</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Degree Type II AV Block</td>
</tr>
<tr>
<td>Atrial premature contraction (Bigeminy)</td>
</tr>
<tr>
<td>2nd Degree Type I AV Block</td>
</tr>
<tr>
<td>Atrial premature contraction (Trigeminy)</td>
</tr>
<tr>
<td>2nd Degree AV Block (2:1)</td>
</tr>
<tr>
<td>Occasional Ventricular premature contraction</td>
</tr>
<tr>
<td>Possible 3rd Degree complete AV Block</td>
</tr>
<tr>
<td>Frequent ventricular premature contraction</td>
</tr>
<tr>
<td>Sinus pause</td>
</tr>
<tr>
<td>Ventricular premature contraction (Bigeminy)</td>
</tr>
<tr>
<td>Atrial escape beat</td>
</tr>
<tr>
<td>Ventricular premature contraction (Trigeminy)</td>
</tr>
<tr>
<td>Atrial escape beat rhythm</td>
</tr>
<tr>
<td>Paroxysmal tachycardia (Ventricular)</td>
</tr>
<tr>
<td>Junctional escape beat</td>
</tr>
<tr>
<td>Paroxysmal tachycardia (Supraventricular)</td>
</tr>
<tr>
<td>Junctional escape beat rhythm</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td>Ventricular escape beat</td>
</tr>
<tr>
<td>Atrial fibrillation (Bradycardia)</td>
</tr>
</tbody>
</table>
### Chapter 5 Operation Instructions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventricular escape beat rhythm</td>
<td>Atrial fibrillation (tachycardia)</td>
</tr>
<tr>
<td>Possible junctional premature contraction</td>
<td>Atrial fibrillation, with aberrant ventricular conduction</td>
</tr>
<tr>
<td>Occasional supraventricular premature contraction</td>
<td>Atrial fibrillation, with long R-R interval</td>
</tr>
<tr>
<td>Frequent supraventricular premature contraction</td>
<td>Atrial fibrillation with 2nd degree AV block</td>
</tr>
<tr>
<td>Supraventricular premature contraction (Bigeminy )</td>
<td>Atrial flutter</td>
</tr>
<tr>
<td>Supraventricular premature contraction (Trigeminy )</td>
<td>Possible atrial flutter</td>
</tr>
<tr>
<td>Occasional atrial premature contraction</td>
<td>Atrial fibrillation+ atrial flutter</td>
</tr>
<tr>
<td>Frequent atrial premature contraction</td>
<td></td>
</tr>
</tbody>
</table>

#### 5.7.3 Set Mode

![Figure 5-9 Work Mode](image)

<table>
<thead>
<tr>
<th>No</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Work Mode</td>
<td>MAN, AUTO, RR ANA</td>
</tr>
<tr>
<td>2</td>
<td>Print Sequence</td>
<td>Sequential, Simultaneous</td>
</tr>
<tr>
<td>3</td>
<td>Sample Mode</td>
<td>Pre-Sample, Real-time Sample, Period Sample, Trigger Sample</td>
</tr>
<tr>
<td>4</td>
<td>Auto Print Mode</td>
<td>12x1, 12x1+P, 6Tx2, 6x2+1rhy, 6x2+1rhy+P, 3x4+3rhy, 3x4+1rhy+P and Template+P</td>
</tr>
</tbody>
</table>
Chapter 5 Operation Instructions

<table>
<thead>
<tr>
<th></th>
<th>DEMO</th>
<th>ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sensitivity</td>
<td>Auto, 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, 40mm/mV</td>
</tr>
<tr>
<td>7</td>
<td>Rhythm style</td>
<td>Single lead</td>
</tr>
<tr>
<td>8</td>
<td>MAN. print mode</td>
<td>12x1, 6Tx2, 6x2+1rhy, 3x4+3rhy, test mode</td>
</tr>
<tr>
<td>9</td>
<td>HR Limit</td>
<td>To set the HR value (0~250) manually</td>
</tr>
<tr>
<td>10</td>
<td>Auto Upload</td>
<td>ON/OFF</td>
</tr>
</tbody>
</table>

1. Work Mode: AUTO-MAN-RR ANA
2. Print Sequence: Sequential, Simultaneous
3. Acquisition Mode:
   - Pre-sample: Press "START/STOP" and it can print the previous 10s waveform under pre-sampling mode.
   - Real-time Sample: Press "START/STOP", it will transmit the real-time 10s ECG information immediately.
   - Period Sample: First of all, set "Period Interval" and "Period Time" in the "Date& Time" menu, and then return to the main interface. After that, "Testing" will display on the interface. If the period interval is 2 minutes, 2 minutes later it will start the printing. 2 minutes later, it will start the second printing. It will last until it reaches the periodic continuous time.
   - Trigger Sample: After choosing trigger acquisition mode, if asystole, ventricular fibrillation, ventricular tachycardia, Ront, missed beat and multiple ventricular premature happens, it will trigger the ECG to print the abnormal waveform automatically, which makes it easy to identify the disease.
4. Auto Print Mode: Set print-forms of ECG waveform. The modes are as follows:
   - 12x1: print 12-channel waveforms parallel;
   - 12x1+P: print 12-channel waveforms parallel in the A4 size;
   - 6Tx2: print 6-channel waveforms parallel;
   - 6x2+1rhy: print 6-channel parallel plus one rhythm waveforms;
   - 6x2+1rhy+P: print 6-channel parallel plus one rhythm waveforms parallel in the A4 size;
   - 3x4+3rhy: print 3-channel plus 3 rhythm waveforms parallel.
   - 3x4+1rhy+P: print 3-channel parallel plus one rhythm waveforms parallel in the A4 size;
   - Template+P: There is no waveform but only analysis in printing report.
5. MAN Print Mode:
6x2: print 6-channel waveforms parallel;
12x1: print 12-channel waveforms parallel;
6x2+1rhy: print 6-channel parallel plus one rhythm waveforms;
3x4+3rhy: print 3-channel plus 3 rhythm waveforms parallel.

Test Mode: it is used for the manufacturer to test the print head and paper skip are in good condition and the external input situation. It is used to test the triangle waveforms.

The auto and manual print mode also can be set up by the shortcut key F1 of the panel, while for the lead mode change is the F4/F5 key.

6. Sensitivity: AUTO, 2.5mm/mV, 5mm/mV, 10mm/mV, 20mm/mV, 40mm/mV;
Under MAN mode, users can choose any of the 6 above sensitivity to get the best ECG signal; under AUTO mode, it is auto gain control, so it will adjust automatically.

5.7.4 Set the Filter Parameters

1. Choose the Filter setting after entering the menu, and touch the “Cancel” or “X” key to exit.
2. The filter setting concludes following items: AC Filter, EMG Filter, ADS Filter, Low-passed Filter, Auto Position.
3. AC Filter: It has two options: on and off.
   EMG Filter: it has four options: 25Hz, 35Hz, 45Hz and off.
   ADS Filter: it has five options: 0.05Hz, 0.15Hz, 0.25Hz, 0.32Hz, 0.5Hz, 0.67Hz and off.
   Low-passed Filter: it has five options: 75Hz, 90Hz, 100Hz, 165Hz and off.
5.7.5 Lead Sequence

1. Choose the **Lead Sequence** setting after entering the menu, and touch the “X” key or press “ESC” to exit.

2. The submenu has two options: Standard and Cabrera. Press the **Tab** key to set the chosen item, and press **SPEED** and **SENS** key to set the parameter.

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lead sequence</td>
<td>standard, Cabrera</td>
</tr>
<tr>
<td>2</td>
<td>Rhythm Lead 1</td>
<td>I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6</td>
</tr>
<tr>
<td>3</td>
<td>Rhythm Lead 2</td>
<td>I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6</td>
</tr>
<tr>
<td>4</td>
<td>Rhythm Lead 3</td>
<td>I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6</td>
</tr>
</tbody>
</table>
5.7.6 Display & Sound

Figure 5-12 display & sound

Table 5-7

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brightness</td>
<td>Standard, darker, brighter</td>
</tr>
<tr>
<td>2</td>
<td>Lead-off Beeper</td>
<td>On/off</td>
</tr>
<tr>
<td>3</td>
<td>QRS Beeper</td>
<td>On/off</td>
</tr>
<tr>
<td>4</td>
<td>Report Beeper</td>
<td>On/off</td>
</tr>
<tr>
<td>5</td>
<td>Waveform Processing</td>
<td>On/off</td>
</tr>
<tr>
<td>6</td>
<td>Key Volume</td>
<td>On/off</td>
</tr>
<tr>
<td>7</td>
<td>HR Over Beeper</td>
<td>On/off</td>
</tr>
<tr>
<td>8</td>
<td>Other Beeper</td>
<td>On/off</td>
</tr>
</tbody>
</table>
5.7.7 Date & Time

Figure 5-13 data& time

Table 5-8

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Current Date</td>
<td>Enter manually</td>
</tr>
<tr>
<td>2</td>
<td>Current Time</td>
<td>Enter it manually</td>
</tr>
<tr>
<td>3</td>
<td>Date Mode</td>
<td>DD-MM-YYYY, MM-DD-YYYY and YYYY-MM-DD</td>
</tr>
<tr>
<td>4</td>
<td>Auto Shutdown</td>
<td>Enter it manually (0~60 Min)</td>
</tr>
<tr>
<td>5</td>
<td>Time Mode</td>
<td>12 hours, 24 hours</td>
</tr>
<tr>
<td>6</td>
<td>Backlight</td>
<td>Enter it manually (0~60 Min)</td>
</tr>
</tbody>
</table>
5.7.8 Set the System Parameter

Figure 5-15 System Setup

Table 5-9

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Language</td>
<td>Chinese, English</td>
</tr>
<tr>
<td>2</td>
<td>External Input</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>3</td>
<td>External Output</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>4</td>
<td>Power Freq.</td>
<td>50Hz, 60Hz</td>
</tr>
<tr>
<td>5</td>
<td>Default</td>
<td>YES/NO</td>
</tr>
<tr>
<td>6</td>
<td>Pacemaker Sensitivity</td>
<td>Low/high</td>
</tr>
<tr>
<td>7</td>
<td>ECG Type</td>
<td>Resting ECG</td>
</tr>
</tbody>
</table>

Table 5-10 “Default” content

<table>
<thead>
<tr>
<th>No.</th>
<th>Setting</th>
<th>Default</th>
<th>No.</th>
<th>Setting</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed</td>
<td>25mm/s</td>
<td>23</td>
<td>HR Limit</td>
<td>150</td>
</tr>
<tr>
<td>2</td>
<td>Print</td>
<td>On</td>
<td>24</td>
<td>Auto Upload</td>
<td>Off</td>
</tr>
<tr>
<td>3</td>
<td>Print Time</td>
<td>10s</td>
<td>25</td>
<td>Lead Sequence</td>
<td>Standard</td>
</tr>
<tr>
<td>4</td>
<td>Time Marker</td>
<td>Off</td>
<td>26</td>
<td>Rhythm Lead 1</td>
<td>II</td>
</tr>
<tr>
<td>5</td>
<td>Print Device</td>
<td>Thermal Printer</td>
<td>27</td>
<td>Rhythm Lead 2</td>
<td>V1</td>
</tr>
<tr>
<td>6</td>
<td>Minnesota Code</td>
<td>On</td>
<td>28</td>
<td>Rhythm Lead 3</td>
<td>V5</td>
</tr>
<tr>
<td>7</td>
<td>Measure</td>
<td>ON</td>
<td>29</td>
<td>AC Filter</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>Analysis</td>
<td>ON</td>
<td>30</td>
<td>ADS Filter</td>
<td>0.67Hz</td>
</tr>
<tr>
<td>9</td>
<td>Template</td>
<td>ON</td>
<td>31</td>
<td>EMG Filter</td>
<td>Off</td>
</tr>
<tr>
<td>10</td>
<td>Acq. Time</td>
<td>60 s</td>
<td>32</td>
<td>Low Pass Filter</td>
<td>75Hz</td>
</tr>
<tr>
<td>11</td>
<td>Period Interval</td>
<td>1 min</td>
<td>33</td>
<td>All Beeper</td>
<td>On</td>
</tr>
</tbody>
</table>
## Chapter 5 Operation Instructions

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Print Duration</td>
<td>60 min</td>
</tr>
<tr>
<td>13</td>
<td>Paper Size</td>
<td>216mm</td>
</tr>
<tr>
<td>14</td>
<td>Work Mode</td>
<td>AUTO</td>
</tr>
<tr>
<td>15</td>
<td>Print Sequence</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>16</td>
<td>Sample Mode</td>
<td>Real-time</td>
</tr>
<tr>
<td>17</td>
<td>Auto Print Mode</td>
<td>12×1</td>
</tr>
<tr>
<td>18</td>
<td>DEMO</td>
<td>Off</td>
</tr>
<tr>
<td>19</td>
<td>Preview</td>
<td>Off</td>
</tr>
<tr>
<td>20</td>
<td>Sensitivity</td>
<td>Auto</td>
</tr>
<tr>
<td>21</td>
<td>Rhythm Style</td>
<td>Single Lead</td>
</tr>
<tr>
<td>22</td>
<td>Man. Print Mode</td>
<td>12×1</td>
</tr>
<tr>
<td>34</td>
<td>Brightness</td>
<td>Standard</td>
</tr>
<tr>
<td>35</td>
<td>Wave Processing</td>
<td>Off</td>
</tr>
<tr>
<td>36</td>
<td>Date Mode</td>
<td>MM-DD-YYYY</td>
</tr>
<tr>
<td>37</td>
<td>Auto shut down</td>
<td>60 min</td>
</tr>
<tr>
<td>38</td>
<td>Time Mode</td>
<td>24hrs</td>
</tr>
<tr>
<td>39</td>
<td>Backlight</td>
<td>30 min</td>
</tr>
<tr>
<td>40</td>
<td>External Input</td>
<td>Off</td>
</tr>
<tr>
<td>41</td>
<td>External Output</td>
<td>Off</td>
</tr>
<tr>
<td>42</td>
<td>Default</td>
<td>Off</td>
</tr>
<tr>
<td>43</td>
<td>Pacemaker Sensitivity</td>
<td>Low</td>
</tr>
</tbody>
</table>

### 5.7.9 Set the Communication

![Communication Setting Interface](image)

Figure 5-15 Communication Setting Interface

1. Choose the **Comm. Setup** after entering the menu, and press the **ESC** key to exit.

#### Table 5-11

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Comm. Method</td>
<td>OFF, Ethernet, UART</td>
</tr>
<tr>
<td>2</td>
<td>Remote IP</td>
<td>Enter it manually (IP of PC connecting with ECG)</td>
</tr>
<tr>
<td>3</td>
<td>Local IP</td>
<td>Enter it manually (local ECG IP)</td>
</tr>
<tr>
<td>4</td>
<td>Gateway</td>
<td>Enter it manually</td>
</tr>
</tbody>
</table>
5.7.10 Set the Advanced Setting

Choose the **Advanced** by entering the password. Users don’t need to enter this interface.
5.7.11 Institution

Table 5-12

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Technician</td>
<td>Input information of technician</td>
</tr>
<tr>
<td>2</td>
<td>Room</td>
<td>Input room information</td>
</tr>
<tr>
<td>3</td>
<td>Doctor</td>
<td>Input doctor information</td>
</tr>
<tr>
<td>4</td>
<td>Institution</td>
<td>Input information of institution</td>
</tr>
</tbody>
</table>

5.7.12 Exit

This icon is used to exit menu interface and return main interface, there is another way to press.

5.7.13 Touch Screen calibration

If touch screen is not sensitive enough, you can do the touch screen calibration again. Method: in menu interface, press “F2” button, there will be a “Enter Password” dialog, input password “999999”, the calibration interface will appear. To calibrate by touching five points appearing on the screen one by one, after the calibration, press to exit.
5.8 How to Use the Battery

⚠️ WARNING ⚠️:

- Inappropriate operation may lead battery to be hot, ignited, exploded, damaged or capacity fade. Before using the rechargeable lithium battery, read this manual carefully.

⚠️ NOTE ⚠️:

- The first time recharging of new battery coming with QRS-12(Class M) should be at least
hours.

1) **Capacity Identification**
Current capacity of the rechargeable battery can be identified according to the battery symbol in the screen.

2) **Recharge**
QRS-12(Class M) is equipped with recharging control circuit together with built-in rechargeable lithium battery. When connect with the AC power supply, the battery will be recharged automatically. And then the battery recharge indicator lamp (_charge) will flicker and the AC power supply indicator lamp (_power) will be lit. When the capacity of battery is full, the battery recharge indicator lamp (_charge) will be bright.

Because of the capacity consumption during storage and transport, the capacity of battery is not full while using at the first time. New battery should be recharged before use for at least 8 hours.

3) **Replacement**

**NOTE:**
- The battery is put into the battery compartment without connecting to the battery socket at factory. After receiving the ECG, if built-in rechargeable battery is to be used, connect the battery to the socket first. See Figure 7-1 for installation.

![Figure 5-21 Battery installation](image)

1. Open the battery compartment cover with the screw-driver enclosed;
2. Insert the battery into the battery pack, properly connected;
3. Close the battery cover.

When the cycling life of battery is over, or foul smell and leakage has been found, please contact the manufacturer or its local distributor for replacement of battery.

**WARNING:**
- Only qualified service engineer authorized by us can open the battery compartment and replace the battery. And the battery of same model and specification provided by manufacturer must be used.
- **Danger of explosion** - Do not reverse the anode and cathode when connecting the battery.
- When the battery’s useful life is over, contact with the manufacturer or local distributor for disposal or dispose the battery according to local regulations.

**5.9 Operation Mode**

There are 3 kinds of operation mode: Auto, Manual and Analysis.
5.9.1 Auto Mode

Mode description: print according to preset printing mode, change leads automatically, printout with measurement value and analysis report.

Operation: press Mode key to choose Auto mode.
Press RUN/STOP key to start printing and press RUN/STOP twice to stop. After printing, the examinee ID will automatically add 1, while examinee name and age will be cleared.

Tips: printing mode can’t be changed during printing.

5.9.2 Man Mode

Mode description: print according to preset printing mode, change leads manually, printout without measurement value and analysis report.

Operation: press Mode key to choose Manual mode.
Press LEAD key, then move the cursor to the left or right to choose the expected lead. Press RUN/STOP key to start printing. During printing, press LEAD key to change lead, or 1mV key to calibrate. Press RUN/STOP key to stop printing.

5.9.3 Analysis Mode

Operation: press mode key to choose Analysis mode.
Press RUN/STOP key and the ECG will start sampling for 1 minute, and then print out the compressed waveform of the lead from “Rhythm Lead 1” in “Lead Sequence” menu with analysis report and R-R histogram. During sampling, press RUN/STOP or Enter key to stop sampling.

5.10 ECG case

![ECG Example Image]

Figure 5-22
As shown in Figure 5-22, content of QRS-12’s report includes: Sensitivity (10mm/mV), HR, filter (AC/50Hz, EMG, ADS), calibration signal (1mV), lead, ECG waveforms, speed (25mm/s), clinic information of patient, date, time, software version, waveform template, measurement data and analysis results.
Chapter 6 Hint Information

Any hint information may appear during operation of QRS-12 such as “Lead-off”, “No Paper”, “No battery” is listed in Table 6-1.

<table>
<thead>
<tr>
<th>Alarm Information</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>V6</td>
<td>Electrodes fall off from the patient or the patient cable falls off from the unit.</td>
</tr>
<tr>
<td>No Paper</td>
<td>Record paper has not been loaded or it has been used out.</td>
</tr>
<tr>
<td></td>
<td>Low battery.</td>
</tr>
</tbody>
</table>

Table 6-1
Chapter 7 Declaration of Auto Measurement & Analysis

Report

Under Auto mode, after 10 seconds’ recording, following parameters will be automatically recognized and measured by QRS-12(Class M):

HR, PR In., QRS In., QT/QTC In., P/QRS/T Axis, RV1/SV5 Amp., RV5/SV1 Amp..

Please pay attention to following factors as regard to automatic measurement.

- Possible misreading of P/Q/T waveform and ST segment caused by severe baseline drift
- Possible error of measurement result due to undefined start/stop position of P/T waveform
- Heart rate measurement value differs each time when R waveform is not detected due to low voltage.
- Calculation of electrical axis of heart or definition of QRS waveforms maybe unreliable due to low voltage
- Difficult definition of P waveform caused by multi-arrhythmia may cause the related parameters unreliable.
- ECG machine only analyzes the waveforms it has acquired, not reflecting all-round status of the patient. This may cause discrepancy with doctor’s diagnosis. Final diagnosis conclusion can be only made after general evaluation of the analysis report produced by the ECG, patient clinical symptom and other clinical laboratory reports.
- The analysis report produced by QRS-12(Class M) can be ONLY applied for the doctor’s clinical reference. It CAN’T be used as final evidence for diagnosis conclusion. Otherwise the company takes no legal liability for any medical treatment dispute thus caused.
Chapter 8 Cleaning, Care and Maintenance

8.1 Cleaning

NOTE:

- Turn off the ECG and plug off the AC power supply cable, patient cable before cleaning and disinfection.

8.1.1 Cleaning the Main Unit and Patient Cable

The surface of the main unit and patient cable can be wiped with a clean soft cloth damped in soapy water or non-caustic neutral detergent. After that, remove detergent remainder with a clean dry cloth.

8.1.2 Cleaning the Electrodes

Remove the remainder gel from the electrodes with a clean soft cloth first. Take the suction bulb and mental cup of chest electrodes apart, and take the clamp and the metal part of the limb electrodes apart. Clean them in warm water and be sure there is no remainder gel. Dry the electrodes with a clean dry cloth or air dry naturally.

8.1.3 Cleaning the Print Head

Dirty and soiled thermal print head can deteriorate the record definition. Clean the print head at least once a month regularly.

Open the recorder casing and remove the paper. Wipe the print head gently with a clean soft cloth damped in 75% alcohol. For stubborn stain, soak it with a little alcohol first and wipe it off with a clean soft cloth. After air dried, load the recording paper and shut the casing of the recorder.

NOTE:

- Prevent the detergent from seeping into the main unit while cleaning. Do not immerse the unit or patient cable into liquid under any circumstances.
- Do not clean the unit and accessories with abrasive fabric and avoid scratching the electrodes.
- Be sure no cleanser remains on the unit, patient cable or electrodes.

8.2 Disinfection

To avoid permanent damage to the ECG, disinfection can be performed only when it has been considered as necessary according to your hospital’s regulations.

Before disinfection clean the equipment first. Then wipe the surface of the ECG and patient cable with hospital standard disinfectant.

NOTE:

- Do not use chloric disinfectant such as chloride and sodium hypochlorite etc.
8.3 Sterilization

To avoid permanent damage to the ECG, sterilization can be performed only when it has been considered as necessary according to your hospital’s regulations. The equipment should be cleaned before sterilization.

**NOTE:**
- Sterilization, if required, can not be done with high temperature, autoclaving or radiation.

**NOTE:**
- Infinium Medical Inc. will not bear the responsibility for the effectiveness of infectious diseases control measure by using the disinfectant or sterilization process. It would be better to consult epidemic experts for advices.

8.4 Care and Maintenance

8.4.1 Recharge and Replacement of Battery

1) Capacity Identification
Current capacity of the rechargeable battery can be identified according to the battery symbol in the screen.

- : Full capacity
- : Not full but enough
- : Capacity is limited, and recharge should be taken into account
- : Battery is weak; and warning message will be displayed on LCD screen. The battery should be recharged immediately

2) Recharge
Infinium Medical Inc. ECG is equipped with recharge control circuit together with built-in rechargeable lithium battery. When connect with the mains supply, the battery will be recharged automatically. And then the battery recharge indicator lamp ( ) will flicker and the mains supply indicator lamp ( ) will be lit. When the capacity of battery is full, the battery recharge indicator lamp ( ) will be lit all the time.

Because of the capacity consumption during storage and transport, the capacity of battery is not full while using at the first time. Battery recharge should be considered before first usage.

3) Replacement

![Figure 8-1 Battery Installation](image-url)
\textbf{Note}:

- The battery is put into the battery compartment without connecting to the battery socket at factory. After receiving the ECG machine, if built-in rechargeable battery is to be used, connect the battery to the socket first. See Figure 8-1 for installation:
  1) Open the battery compartment cover with the screw-driver attached;
  2) Insert the battery into the battery pack, properly connected;
  3) Close the battery cover.
When the useful life of battery is over, or foul smell and leakage has been found, please contact with manufacturer or local distributor for replacement of battery.

\textbf{Warning}:

- Inappropriate operation may lead battery to be hot, ignited, exploded, damaged or capacity fade. Before using the rechargeable Ni-MH battery, read the \textit{Operation Manual} carefully.
- Only qualified service engineer authorized by Infinium Medical Inc. can open the battery compartment and replace the battery. And the battery of same model and specification provided by manufacturer must be used.
- \textbf{Danger of explosion} - Do not reverse the anode and cathode when connecting the battery.
- When the battery’s useful life is over, contact with the manufacturer or local distributor for disposal or dispose the battery according to local regulations.

8.4.2 Recording Paper

\textbf{Note}:

- Recording paper provided by manufacturer should be used. Other paper may shorten thermal print head’s life. And the deteriorated print head may lead to illegible ECG record and block the advance of paper etc.

\textbf{Storage Requirements}:

- Record paper should be stored in dry, dark and cool area, avoiding excessive temperature, humidity and sunshine.
- Do not put the paper under fluorescence for long time.
- Be sure that there is no polyvinyl chloride or other chemicals in the storage environment, which will lead to color change of the paper.
- Do not overlap the recorded paper long time. Otherwise the ECG record may trans-print each other.

8.4.3 Main Unit, Patient Cable & Electrodes

1) Main Unit
   a. Avoid excessive temperature, sunshine, humidity or dirt.
   b. Put on the dustproof coat after use and prevent from shaking violently when moving it to another place.
c. Prevent any liquid from seeping into the ECG, as it will affect the safety and performance of the ECG.

2) Patient Cable

a. Integrity of patient cable, including main cable and lead wires, should be checked regularly. Be sure that it is conductible.

b. Do not drag or twist the patient cable with excessive stress while using. Hold the connector plugs instead of the cable when connect or disconnect the patient cable.

c. Align the patient cable to avoid twisting, knotting or crooking in closed angle while using.

d. Store the lead wires in bigger wheel to prevent any people from stumbling.

e. Once damage or aging of the cable patient has been found, replace it with a new one immediately.

3) Electrodes

a. Electrodes must be cleansed after use and be sure there is no remainder gel on them.

b. Keep the suction bulb of chest electrode from sunshine and excessive temperature.

c. After long-term use, the surface of electrodes will be oxidized because of erosion and other causes. In this case, electrodes should be replaced to achieve high-quality ECG.

⚠️ **NOTE** ⚠️:

- The ECG and reusable accessories can be sent back to the manufacturer for recycling or proper disposal after their useful lives.
Chapter 9 Common Troubleshooting and Solution

1) Some Lead without Waveform Printout
   Possible reason: Normally the ECG needs some seconds to detect the patient cable while it is connected with the patient.
   Solution: repeat operation.

2) Vertical Broken Track of Printed Waveform
   Possible reason: This may be caused by dirt on the printer head.
   Solution: clean the printer head.
   If the problem still exists, there may be damage of the printer head. Please contact with our service department or appointed maintenance center.

3) Failure to turn on the ECG
   Possible reason: Fuses burnt
   Solution: Unscrew the fuse holder and install the fuses enclosed.

   Warning:
   - AC power cable must be plugged out from AC power source when replacing the fuse to avoid any possible electric shock.

4) Failure to turn off the ECG
   Possible reason: menu or Sub-menu not exits
   Solution: exit the menu

5) AC Interference (as shown in Figure 9-1)

   ![](image)

   Figure 9-1

   Possible reason:
   a. Equipment is not properly grounded;
   b. Electrode or patient cable is correctly connected;
   c. There is not enough cream applied;
   d. Patient bed is not properly grounded;
   e. Patient bed is not properly grounded;
   f. Patient touches metal part of the patient bed;
   g. Somebody is touching the patient;
   h. There is a powerful equipment operating nearby;
   i. The patient is wearing glass or diamond ornaments;
Chapter 9 Common Troubleshooting and Solution

j. AC power frequency.

Solution:

- Ground the equipment properly;
- Connect the electrode and patient cable correctly;
- Apply enough cream;
- Ground the patient bed properly;
- Ask the patient not touch the metal part of the patient bed;
- Don’t touch the patient;
- Wait till the powerful equipment stops;
- Remove the glass or diamond ornaments from the patient;
- Reset AC frequency accordingly to local AC frequency.

If interference still exists, please apply HUM filter. The waveform will be weakened a little.

6) EMG Interference (as shown in Figure 9-2)

![Figure 9-2](image)

Possible reason:

a. The room is uncomfortable;

b. The patient is nervous;

c. The bed is too narrow;

d. The patient is talking;

e. The limb electrodes are tightly attached.

Solution:

- Move to a comfortable room;
- Ask the patient to be relaxed;
- Change a wider patient bed;
- Don’t talk with the patient during operating;
- Change the limb electrode if it is too tight.

If interference still exists, please apply EMG filter. The waveform will be weakened a little.
Chapter 10 Service Warranty

1) Workmanship and Raw Material
   Infinium Medical Inc. warrant there’s no defect in raw material and workmanship. During warranty period, Infinium Medical Inc. will repair or replace the defective part free of charge if the defect has been confirmed as raw material or workmanship defect.

2) Software or Firmware
   For the software or firmware installed, Infinium Medical Inc. will replace them free of charge if the defect has been confirmed as raw material or workmanship defect within 18 months from the date of shipment. But Infinium Medical Inc. can not warrant it will not interrupt the use of the ECG.

   !NOTE!: 
   • All services must be finished by engineers authorized by Infinium Medical Inc. or its authorized distributor.

3) Exemption of Warranty
   The charges of freight and others are excluded under warranty.
   The warranty is void in the case of:
   4 Assembly, extensions, readjustments of any parts;
   5 Modification and repair by unauthorized personnel;
   6 Subsequent damage caused by improper use or maintenance;
   7 Replacement or remove of serial number label and manufacturer label.

Service Information
   Service Unit: Infinium Medical Inc. Electronics, Co., Ltd.
   If there is any question, please contact us immediately.

Service Contact
   Infinium Medical
   12151 62ns st N
   Largo FL USA
   1-727-531-8434   fax 1-727-531-8436
   e-mail: sales@infiniummedical.com

website: www.infiniummedical.com
Chapter 11 Accessories

⚠️ WARNING ⚠️:

- Only patient cable and other accessories supplied by the manufacturer can be used. Otherwise the performance and electric shock protection can not be guaranteed.

<table>
<thead>
<tr>
<th>No.</th>
<th>Accessory</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power cord</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Patient cable</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Chest electrodes</td>
<td>6 pcs</td>
</tr>
<tr>
<td>4</td>
<td>Limb electrodes</td>
<td>4 pcs</td>
</tr>
<tr>
<td>5</td>
<td>Paper roller</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Thermal sensitive paper</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Ground lead</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Fuse</td>
<td>2 pcs</td>
</tr>
<tr>
<td>9</td>
<td>Small flat-head screwdriver</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Dust Cover</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Touch pen</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 11-1 Accessories List
# Appendix I Technical Specifications

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>MDD93/42/EEC</th>
<th>Medical Device Directive</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60601-1: 1988</td>
<td></td>
<td>Medical electrical equipment - Part 1: General requirements for basic safety and essential performance</td>
</tr>
<tr>
<td>IEC 60601-2-25:1993+</td>
<td></td>
<td>Medical electrical equipment - Part 2-25: Particular requirements for the safety of electrocardiographs; Amendment 1</td>
</tr>
<tr>
<td>A1:1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN ISO14971-2009</td>
<td></td>
<td>Medical devices - Application of risk management to medical devices</td>
</tr>
<tr>
<td>YY1139:2000</td>
<td></td>
<td>Single and multichannel electrocardiograph</td>
</tr>
</tbody>
</table>

| Classification         | Anti-electric-shock type: Class I with internal power supply |
|                       | Anti-electric-shock degree: Type CF with defibrillator protection |
|                       | Degree of protection against harmful ingress of water: Ordinary equipment (Sealed equipment without liquid proof) |
|                       | Degree of safety of application in the presence of flammable gas: Equipment not suitable for use in the presence of flammable gas |
|                       | Working Mode: Continuous operation |
|                       | EMC: Group I, Class B |

| Dimensions            | 338mm×280mm×85mm |
|                       | Net Weight       | 3.5kgs |
| Display               | 7.0 inches 800×480 color LCD (touch screen) |
## Appendix I Technical Specifications

### Environment

<table>
<thead>
<tr>
<th></th>
<th>Transport</th>
<th>Storage</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-20°C~ +55°C</td>
<td>-10°C~ +40°C</td>
<td>+5°C~ +40°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>25%~95%</td>
<td>25%~85%</td>
<td>25%~85%</td>
</tr>
<tr>
<td>Atmospheric Pressure</td>
<td>700hPa~1060hPa</td>
<td>700hPa~1060hPa</td>
<td>700hPa~1060hPa</td>
</tr>
</tbody>
</table>

### Power Supply

<table>
<thead>
<tr>
<th>Mains Supply</th>
<th>Rated voltage = 100V~240V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rated frequency = 50/60Hz</td>
</tr>
<tr>
<td></td>
<td>Rated input power = 75VA</td>
</tr>
<tr>
<td>External DC power supply</td>
<td>Rated output voltage = 19V</td>
</tr>
<tr>
<td></td>
<td>Rated output current = 3.5A</td>
</tr>
<tr>
<td>Built-in rechargeable Battery Pack</td>
<td>Rated voltage = 14.4V</td>
</tr>
<tr>
<td></td>
<td>Discharge cut-off voltage ≥ 11V</td>
</tr>
<tr>
<td></td>
<td>Rated capacity = 4400mAh</td>
</tr>
<tr>
<td></td>
<td>Charge mode: Constant current/voltage</td>
</tr>
<tr>
<td></td>
<td>Charge current (standard) ≤ 0.3C5A(1320mA)</td>
</tr>
<tr>
<td></td>
<td>Charge voltage (standard) = (16.8±0.1V)</td>
</tr>
<tr>
<td></td>
<td>Cycle life ≥ 500 times</td>
</tr>
<tr>
<td>Fuse</td>
<td>T2A/AC 250V Ø5×20</td>
</tr>
</tbody>
</table>

### Recorder

<table>
<thead>
<tr>
<th>Record Mode</th>
<th>Thermal dot-matrix printer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording Paper</td>
<td>Rolled thermal sensitive paper</td>
</tr>
<tr>
<td>Paper Width</td>
<td>Rolled paper: 210/216 mm</td>
</tr>
<tr>
<td>Effective width</td>
<td>Rolled paper: 200/206mm</td>
</tr>
<tr>
<td>Paper Speed</td>
<td>5 mm/s, 6.25 mm/s, 10 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s(±3%)</td>
</tr>
</tbody>
</table>

### HR Recognition

<table>
<thead>
<tr>
<th>Technique</th>
<th>Peak-peak detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR Range</td>
<td>30BPM~250BPM</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1BPM</td>
</tr>
</tbody>
</table>
## External Input/Output (Optional)

<table>
<thead>
<tr>
<th>Input (Single ended)</th>
<th>Input impedance ≥100k Ω; Sensitivity 10mm/V±5%;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output (Single ended)</td>
<td>Output impedance ≤100 Ω; Sensitivity 1V/mV±5%;</td>
</tr>
</tbody>
</table>

## Communication Interface

- RS232 serial port/USB/LAN

## ECG Unit

<table>
<thead>
<tr>
<th>Leads:</th>
<th>12 standard leads, lead change, manually/automatically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition Mode:</td>
<td>12 lead acquisition simultaneously</td>
</tr>
<tr>
<td>Input Circuit:</td>
<td>Floating, protection against defibrillator effect</td>
</tr>
<tr>
<td>A/D switch:</td>
<td>24 bit</td>
</tr>
<tr>
<td>Time Constant:</td>
<td>≥3.2s</td>
</tr>
<tr>
<td>Frequency Response:</td>
<td>0.05Hz ~ 165Hz</td>
</tr>
<tr>
<td>Sensitivity:</td>
<td>Auto, 2.5, 5, 10, 20, 40 (mm/mV) ±5 %</td>
</tr>
<tr>
<td>Input Impedance:</td>
<td>&gt;50M Ω (10Hz)</td>
</tr>
<tr>
<td>Input Circuit Current:</td>
<td>≤50nA</td>
</tr>
<tr>
<td>Input Voltage Range:</td>
<td>±5 mVpp</td>
</tr>
<tr>
<td>Calibration Voltage:</td>
<td>1mV±2%</td>
</tr>
<tr>
<td>Depolarization Voltage:</td>
<td>±700m V</td>
</tr>
<tr>
<td>Noise:</td>
<td>&lt;15 μVp-p</td>
</tr>
<tr>
<td>Filter:</td>
<td>EMG Filter: 25/35/45Hz</td>
</tr>
<tr>
<td></td>
<td>ADS Filter: Yes/No</td>
</tr>
<tr>
<td></td>
<td>HUM Filter: Yes/No</td>
</tr>
<tr>
<td>CMRR:</td>
<td>≥120dB</td>
</tr>
<tr>
<td>Patient Leakage Current:</td>
<td>&lt;10 μA (a.c.)</td>
</tr>
<tr>
<td>Dielectric Strength:</td>
<td>4000V rms</td>
</tr>
</tbody>
</table>
## Appendix II EMC Information

### Guidance and manufacturer’s declaration – electromagnetic emission – for all EQUIPMENT AND SYSTEMS

<table>
<thead>
<tr>
<th></th>
<th>Guidance and manufacturer’s declaration – electromagnetic emission</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>QRS-12 is intended for use in the electromagnetic environment specified below. The user should assure that it is used in such an environment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Emissions test</td>
<td>Compliance</td>
<td>Electromagnetic environment - guidance</td>
</tr>
<tr>
<td>4</td>
<td>RF emissions CISPR 11</td>
<td>Group I</td>
<td>QRS-12 electrocardiograph uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td>
</tr>
<tr>
<td>5</td>
<td>RF emissions CISPR 11</td>
<td>Class B</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Harmonic emissions IEC 61000-3-2</td>
<td>Class A</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Voltage fluctuations/flicker emissions IEC 61000-3-3</td>
<td>Complies</td>
<td></td>
</tr>
</tbody>
</table>
Appendix II EMC Information

**Guidance and manufacturer's declaration – electromagnetic immunity – for all EQUIPMENT and SYSTEMS**

QRS-12 is intended for use in the electromagnetic environment specified below. The user should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity test</th>
<th>IEC 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic discharge (ESD)</td>
<td>± 6 kV contact ± 8 kV air</td>
<td>± 6 kV contact ± 8 kV air</td>
<td>Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.</td>
</tr>
<tr>
<td>IEC 61000-4-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrostatic transient / burst</td>
<td>± 2 kV for power supply lines ± 1 kV for input/output lines</td>
<td>± 2 kV for power supply lines ± 1 kV for input/output lines</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>IEC 61000-4-4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge</td>
<td>± 1 kV differential mode ± 2 kV common mode</td>
<td>± 1 kV differential mode ± 2 kV common mode</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>IEC 61000-4-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage dips, short interruptions and voltage variations on power supply input lines</td>
<td>&lt; 5 % UT (&gt;95 % dip in UT ) for 0,5 cycle 40 % UT (60 % dip in UT ) for 5 cycles 70 % UT (30 % dip in UT ) for 25 cycles &lt; 5 % UT (&gt;95 % dip in UT ) for 5 sec</td>
<td>&lt; 5 % UT (&gt;95 % dip in UT ) for 0,5 cycle 40 % UT (60 % dip in UT ) for 5 cycles 70 % UT (30 % dip in UT ) for 25 cycles &lt; 5 % UT (&gt;95 % dip in UT ) for 5 sec</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. If the user requires continued operation during power mains interruptions, it is recommended that the ECG be powered on from an uninterruptible power supply or a battery.</td>
</tr>
<tr>
<td>IEC 61000-4-11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power frequency (50/60 Hz)</td>
<td>3 A/m</td>
<td>3 A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>magnetic field IEC 61000-4-8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE: UT is the a. c. mains voltage prior to application of the test level.**
QRS-12 is intended for use in the electromagnetic environment specified below. The user should assure that it is used in such an environment.

<table>
<thead>
<tr>
<th>Immunity test</th>
<th>IEC 60601 test level</th>
<th>Compliance level</th>
<th>Electromagnetic environment - guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducted RF</td>
<td>3 Vrms 150 kHz to 80 MHz</td>
<td>3 V</td>
<td>Portable and mobile RF communications equipment should be used no closer to any part of the ECG including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$d = \left[ \frac{3.5}{E_1} \right] V_1$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$d = \left[ \frac{3.5}{E_1} \right] V_1$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 V/m</td>
<td>$d = \left[ \frac{7}{E_1} \right] P$</td>
</tr>
<tr>
<td>Radiated RF</td>
<td>3 V/m 80 MHz to 2,5 GHz</td>
<td></td>
<td>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey (a) should be less than the compliance level in each frequency range (b). Interference may occur in the vicinity of equipment marked with the following symbol:</td>
</tr>
</tbody>
</table>

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the QRS-12ECG is used exceeds the applicable RF compliance level above, the ECG should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the ECG.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.
Appendix II EMC Information

Recommended separation distances between portable and mobile RF communications equipment and the EQUIPMENT or SYSTEM - for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

QRS-12 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and as recommended below, according to the maximum output power of the communications equipment.

<table>
<thead>
<tr>
<th>Rated maximum output of transmitter W</th>
<th>150 kHz to 80 MHz $d = \frac{3.5}{V_i}\sqrt{P}$</th>
<th>80 MHz to 800 MHz $d = \frac{3.5}{E_i}\sqrt{P}$</th>
<th>800 MHz to 2.5 GHz $d = \frac{7}{E_i}\sqrt{P}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.12</td>
<td>0.12</td>
<td>0.23</td>
</tr>
<tr>
<td>0.1</td>
<td>0.38</td>
<td>0.38</td>
<td>0.73</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>1.2</td>
<td>2.3</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
<td>3.8</td>
<td>7.3</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
<td>12</td>
<td>23</td>
</tr>
</tbody>
</table>

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

**NOTE 1** At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

**NOTE 2** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.
Appendix III Environmental Statement

1. Identification
The mark for control of pollution caused by electronic information products in this diagnosis system is as the following picture shows:

The number “50” in the mark is environmental protection use period ("EPUP"), of which the unit is year. It means the environmental protection use period ("EPUP") is fifty years from its production. The mark gives the following information: the hazardous substances will not leak or mutate under the normal conditions of use and the use of the product will not cause serious pollution to the environment or serious damage to their personal and property, when the product is used in the environment-friendly use period.

2. Infinium Medical Inc. provides the following table which applies to all parts of its products.

<table>
<thead>
<tr>
<th>Parts of Product</th>
<th>Hazardous Substances Table</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lead (Pb)</td>
</tr>
<tr>
<td>Built-in Breadboard</td>
<td>○</td>
</tr>
<tr>
<td>Built-in Connector</td>
<td>○</td>
</tr>
<tr>
<td>Sheet Metal</td>
<td>×</td>
</tr>
<tr>
<td>Outer Casing</td>
<td>○</td>
</tr>
<tr>
<td>Display Block</td>
<td>×</td>
</tr>
<tr>
<td>Packing Material</td>
<td>×</td>
</tr>
<tr>
<td>Accessories</td>
<td>×</td>
</tr>
</tbody>
</table>

*O* indicates that this hazardous substance, for the corresponding part of these products, is below the limit requirement in SJ/T 11363-2006.

*X* indicates that this hazardous substance contained in at least one of the corresponding part of these products, is above the limit requirement in SJ/T 11363-2006.