



Training Excellence

BeneHeart R12

Advanced User Guide

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Section 1 Safety Notes

- Before using, the operator must verify that the equipment, connecting cables and accessories are clean and in correct working order.
- Do not open the equipment housing. All servicing and upgrades must be carried out by fully trained and authorised personnel.
- This equipment is not intended to be used with high frequency surgical units.
- Keep away from fluid. If liquids have entered the equipment remove the device from use and have it checked by service personnel.
- For paced patients, the equipment may mistake a pace pulse for a QRS complex if several adverse conditions exist simultaneously. Always keep these patients under close surveillance.
- Magnetic and electrical fields are capable of interfering with the performance of the equipment. For this reason, make sure that all external devices operated in the vicinity of the equipment comply with the relevant EMC requirements. Mobile phone, X-ray equipment or MRI devices are a possible source of interference as they may emit higher levels of electromagnetic radiation.
- Please note: the physiological data and waveforms displayed on the equipment are for reference only and cannot be directly used for diagnostic interpretation.

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Section 2 Battery

- The battery indicator on the operating panel will be unlit if the device is mains powered or lit green if using battery power.

Battery type	Rechargeable lithium-ion
Run time, when powered by a new fully charged battery	≥ 400 Auto Measurement reports or minimum 1 hour continuous paper recording or minimum 3.5 hours of continuous paperless recording
Charge Time (with power off)	≤ 6 hours to 90% capacity ≤ 7 hours to 100% capacity
Shutdown delay (after a low battery message first occurs)	Minimum 5 minutes

- The battery is charged whenever the device is connected to an AC power source, regardless of whether the device is switched on.
- On-screen battery symbols (top right corner of display) indicate battery status as follows:



Indicates that the battery works correctly. The solid green portion represents the current battery charge level. Each block represents a charge of approximately 20% capacity.



Indicates that the battery has a low charge level and needs to be charged. In this case, the LED turns yellow and the message **[Low Battery]** is shown at the bottom of the screen.



Indicates that the battery is almost depleted and needs to be charged immediately



Indicates that no battery is installed, or the battery fails to charge

- Exchange or conditioning of the battery should be carried out by authorised personnel only. Please refer to the **BeneHeart R12 Operators Manual** for more information.

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Section 3 Equipment Overview

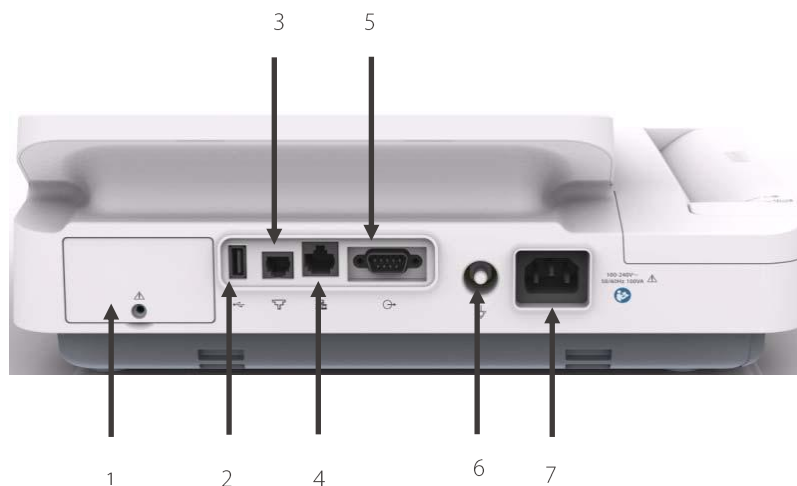
Front View



1. Thermal recorder: prints reports
2. Hard keys
3. Indicators
4. Display screen: presents waveforms and text
5. Soft keys: only for the equipment configured with a touchscreen. Press the soft keys to select the options.
Soft key labels: only for the equipment not configured with a touchscreen. See soft keys below.
6. Soft keys: only for equipment not configured with a touchscreen. The soft keys illuminate when the equipment is powered on. Press the soft keys to select the options that appear on the right side of the screen. For equipment configured with a touchscreen there are no keys in this area.
7. USB connector: connects USB devices, such as a USB drive, external printer or barcode reader
8. Patient cable connector: connects the patient cable for ECG acquisition
9. Keyboard

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Back View



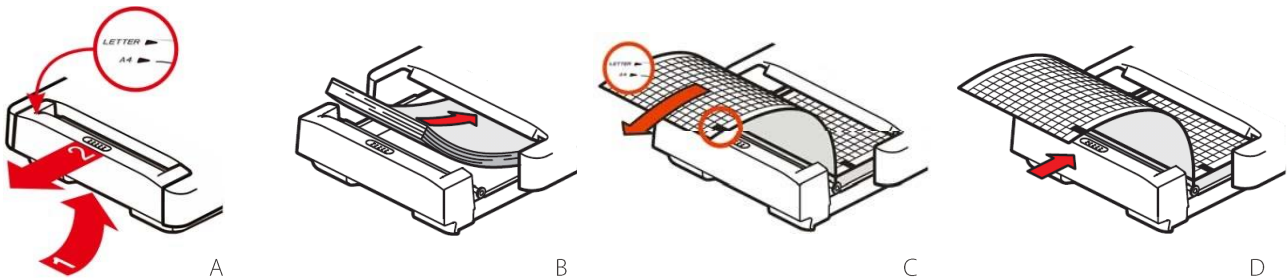
1. Battery compartment
2. USB connector: connects USB devices, such as a USB drive, external printer, or barcode reader
3. Telephone line connector: for future external devices - do not use
4. Network connector: a standard RJ45 connector for software upgrade and sending ECG data
5. Analog output connector: for future external devices - do not use
6. Equipotential Grounding Terminal: when using the monitor together with other devices, connect their equipotential grounding terminals together to eliminate the potential differences between them
7. AC power input: connects the power cord to run the equipment on AC power supply

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Section 4 Device Setup

Loading Paper

- Before printing ECG reports, ensure that thermal recording paper is loaded. The equipment supports Z-fold paper.



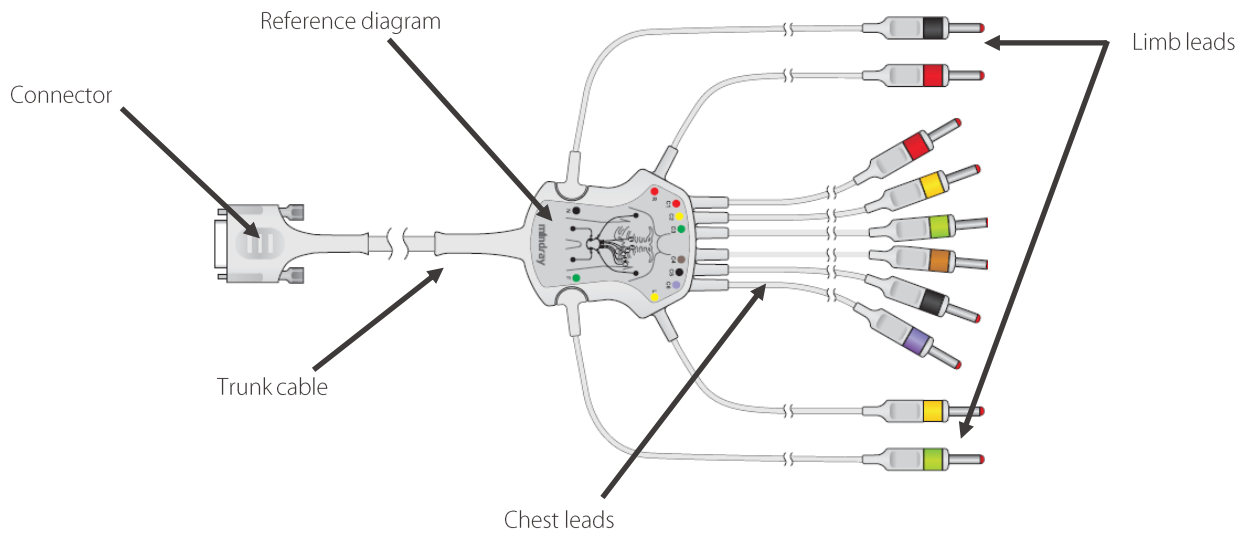
- Lift the lever underneath the paper tray and pull out the paper tray until it stops.
- Place a stack of paper in the tray. The top page of a new pad will have an arrow indicating the direction of insertion.
- Lift the first sheet of paper, flip it over the roller holder and align the upper edge of the paper with the paper guide. Make sure that the print side (grid side) faces up and the black mark on the lower left corner of the paper is visible.
- Firmly push the paper tray until it snaps back into place.

For correct alignment, only use thermal recording paper supplied by Mindray UK.

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Connecting the Patient Cable

The patient cable consists of a connector, a trunk cable, 4 limb lead wires and 6 chest lead wires. The lead wires are colour-coded and a reference diagram can be seen on the trunk cable.



- Plug the patient cable to the connector on the right side of the equipment. Ensure the connector on the cable is arrow-side up.
- Tighten the screws to securely attach the patient cable to the equipment.
- Attach the crocodile clips to the end of each lead wire to enable connection to the electrodes.

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Section 5 System Setup

Accessing the Main Menu

- Press the **[Setup]** key to access the main menu. To configure the equipment:
- Press the arrow keys on the keyboard to navigate menu options or press the **[Prev]** or **[Next]** soft key to move to the previous or the next menu item.
- Press the **[Back]** soft key or the **[Esc]** key on the keyboard to return to the previous menu.
- Press the **[Select]** or the **[Cancel]** soft key to select or deselect a menu item.
- Press the **[Enter]** soft key or the **[Enter]** key on the keyboard to confirm the selection.

Menu		EN A ₁ USB 14:00	⏪
Waveform Setup	Muscle Artifact Filter	35 Hz ▾	Back
	Baseline Drift Removal	<input type="checkbox"/>	
Report Setup	AC Filter	<input type="checkbox"/>	▲
File Management	Screen Waveform Format	3 × 4 + 1 ▾	Prev
	Speed	25 mm/s ▾	
Basic Setup	Gain	10 mm/mV ▾	Next
	Pacemaker Label	<input type="checkbox"/>	
Maintenance	Lead Sequence	Standard ▾	⏩
			Enter

In the main menu you can:

- Configure waveforms
- Configure recordings
- Manage files
- Customise patient information
- Perform system setup

The settings in the main menu are saved as user defaults and remain effective even after the equipment is switched off and restarted. Changes made to Speed, Gain and Filter using the soft keys will return to the default setting when the device is switched off.

For devices with a touchscreen, you may find it necessary to calibrate the touchscreen occasionally. To do this, enter the **[Basic Setup]** menu and select **[Calibrate Touchscreen]**. Follow the on-screen instructions.

Please see the ***BeneHeart R12 Operator's Manual*** for the full list of menu functions.

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Section 6 Advised Setup

Below are the advised initial setup steps. The options suggested are in addition to the existing selections in the default configuration unless otherwise stated. Following these steps before the first use will ensure the most effective default configuration for the majority of users.

If your device has already been configured, skip this section and move to **Section 8: Patient Demographics**.

Set patient information

For devices with a touchscreen you may tap directly on the menu item required.

For devices without a touchscreen follow the steps below:

- Use the **[Setup]** key to access the Main Menu.
- Use the **[Next]** soft key to scroll down to **[Basic Setup]**.
- Press **[Enter]**.
- Select **[Patient Info Setup]**.
- Press **[Enter]**.

- First select **[ID]** from the **[Required Patient Info]** section. This creates a prompt to input the Patient ID (Hospital Number) when the ECG key is pressed, ensuring all recordings are labelled.

- Then select items from the **[Detailed Patient Info]** section. Use the arrow soft keys, **[Select]** and **[Cancel]** (if required) to navigate the screen. This allows you to decide which details can be added when the Patient ID key is pressed. (Basic information of ID, last name, first name, gender and age are included as default).
 - *Advised selections: **[DOB]** and **[V3 Placement]**

- On completion select **[Back]** to return to the previous menu.

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Set date and time

- Use the [**Setup**] key to access the Main Menu.
- Use [**Next**] to scroll down to [**Basic Setup**].
- Press [**Enter**].
- Use the arrow keys to scroll to required menu item, e.g. day, month or year.
- Press [**Enter**].
- Use the arrow keys until desired option is reached.
- Press [**Enter**].

The highlighted area will now automatically move onto the next field. Continue with this process until all date and time settings are correct.

- For [**Lead Notation**] select [**IEC**].
- Choose your preferred selections for [**Auto Standby**] and [**Auto Shutdown**].
- Press [**Back**] to return to the previous menu.

Waveform Setup

- No recommended changes to default setup.

Report Setup

- Select [**Extend Record**]. The device automatically performs a rhythm measurement and prints a rhythm report if critical values "Extreme Tachycardia", "Extreme Bradycardia", or "Significant Arrhythmia" are detected at the completion of auto measurement.

File Management

- Select [**Preview**]. This allows the ECG to be checked before printing to ensure ECG thermal recording paper is not wasted.

Maintenance

- No recommended changes to default setup.

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Section 7 Configuration

Managing the Configuration

Select [**Setup**] → [**Maintenance**] → enter the required password using the keyboard.

Functions available:

- Load configuration
- Export configuration
- Print configuration
- Restore to default configuration

When a USB memory stick is inserted into the USB connector you may see the message “Do you want to export ECG data?” Select [**Cancel**] if you wish to perform the following actions.

Loading Configuration

You can import a configuration file stored on a USB memory stick into the device’s internal memory.

1. Insert the USB stick into the USB connector on the back of the equipment.
2. Select [**Setup**] → [**Maintenance**] → [**Enter Password**] → [**Load Config**].
3. Follow the on-screen instructions.

Exporting Configuration

You can export the configuration file stored in the equipment’s internal memory to a USB memory.

1. Insert a USB memory into the USB connector on the back of the equipment.
2. Select [**Menu**] → [**Maintenance**] → [**Enter Password**] → [**Export Config**].
3. Follow the on-screen instructions.

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Section 8 Patient Demographics

Some patient information may directly affect ECG analysis. Complete and correct patient information is helpful for accurate diagnosis and treatment of the patient.

For a new patient, enter patient information before taking an ECG measurement.

- You can quickly enter patient information by pressing the **[ID]** hard key.
 1. Press the **ID** key to enter the **[Patient Info]** menu.
 2. In the **[New Patient]** screen, enter the patient information using the keyboard.
 3. Use the keyboard **[Enter]** key to move to the next item.
 4. Press the **[Save]** soft key to save the patient information.

New Patient	*ID:	<input type="text"/>
	*Last Name:	<input type="text"/>
Edit Patient ID	First Name:	<input type="text"/>
	*Age:	<input type="text"/> Years ▾
	*Gender:	▾
Patient List	Race:	▾
	V3 Placement:	Standard Position ▾

- To edit the current patient's information after it has been saved:
 1. Press the **ID** key to enter the **[Patient Info]** menu.
 2. In the **[Edit Patient ID]** screen make the required alterations.
 3. Press the **[Save]** soft key to save the patient information.

After the patient's information is saved, the patient is added to the Patient List. The Patient List can include up to 500 patients.

- To look up a previous patient's information:
 1. Press the **ID** key to enter the **[Patient Info]** menu.
 2. Select the **[Patient List]** screen.
 3. Use the arrow soft keys to scroll to the correct patient, or tap the **[Search]** soft key and enter the patient's ID in the search box (you may use just part of the ID to see a list of all patients containing that combination of digits).
 4. **[Select]** the correct patient.

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5. You then have the option to edit the information before selecting [**Save**] to start a new patient record.

The device will prompt the user to input patient details when the [**ECG**] button is pressed. Please see **Set Patient Information** in **Section 6: Advised Setup** for details.

The paediatric lead placement V4R is recommended if the patient is under 16 years of age. Please record V4R using the V3 electrode (see **Section 9: Patient Preparation**). This is normal practice for a patient of this age. This requires the [**V3 Placement**] setting to be changed to [**V4R Position**] in the [**Patient Info Setup**] menu.

The device will discharge a patient when switched off. However, if you are moving directly to another patient please ensure the device is cleaned and the new patient's details are entered by selecting [**ID**] and inputting details on the [**New Patient**] screen as described above.

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Section 9 Patient Preparation

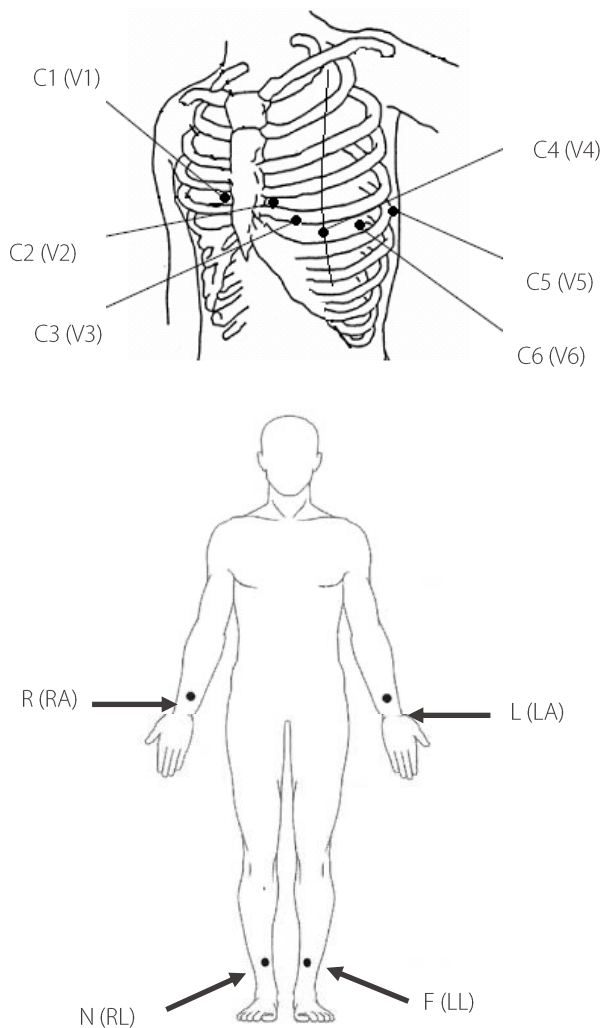
- Lay the patient on a bed with arms resting at their side and legs lying flat and not touching. Ensure the patient is comfortable and relaxed.

Prepare the Skin

Careful skin preparation is the key to high-quality ECG signals.

1. Expose the chest and electrode sites on the limbs.
2. Shave hair from each electrode site.
3. Degrease each electrode site with alcohol and abrade slightly with dry gauze to remove dead skin cells.
4. Ensure the skin is completely dry.

Electrode Positioning



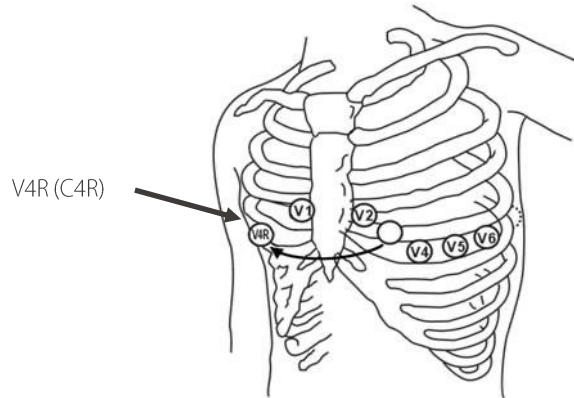
Lead (IEC)	Lead (AHA)	Electrode Placement
C1	V1	4th intercostal space at the right sternal border
C2	V2	4th intercostal space at the left sternal border
C3	V3	Midway between C2 and C4 electrode positions
C4	V4	5th intercostal space at the left mid-clavicular line
C5	V5	Left anterior axillary line, horizontal with the C4 electrode position
C6	V6	Left mid-axillary line, horizontal with the C4 electrode position
R	RA	Above right wrist
L	LA	Above left wrist
N	RL	Above right ankle
F	LL	Above left ankle

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- Limb electrodes may be placed more proximally on the limb if required, but wherever possible the opposite limb lead should be positioned to match.

Paediatric Placement

When acquiring a paediatric ECG, an alternative to the standard V3 (C3) placement may be used. Place the sensor in the V4R (C4R) position, on the right side of the chest in a position corresponding to V4 (C4).



- If this placement is used [V4R Position] should be selected in the [Patient Info] menu for correct lead-wire labelling. Please see **Section 8: Patient Demographics**.

Applying Electrodes

1. Ensure disposable electrodes are in date and have been stored inside the packet to avoid the drying out of conductive gel.
 2. Place the electrodes on the sites as shown above. To obtain a high-quality ECG signal, make sure that the electrodes firmly contact the skin.
 3. Route the lead wires to avoid twisting. Connect the lead wires with the electrodes.
 4. Make sure the patient cable is tightly connected to the device and electrodes are correctly connected with the lead wires.
- When placing the chest electrodes, ensure that the electrodes do not touch each other and conductive gel from one site does not touch another site.
 - Limb electrodes should be placed on fleshy areas above the inside wrists and ankles, not on the bone.

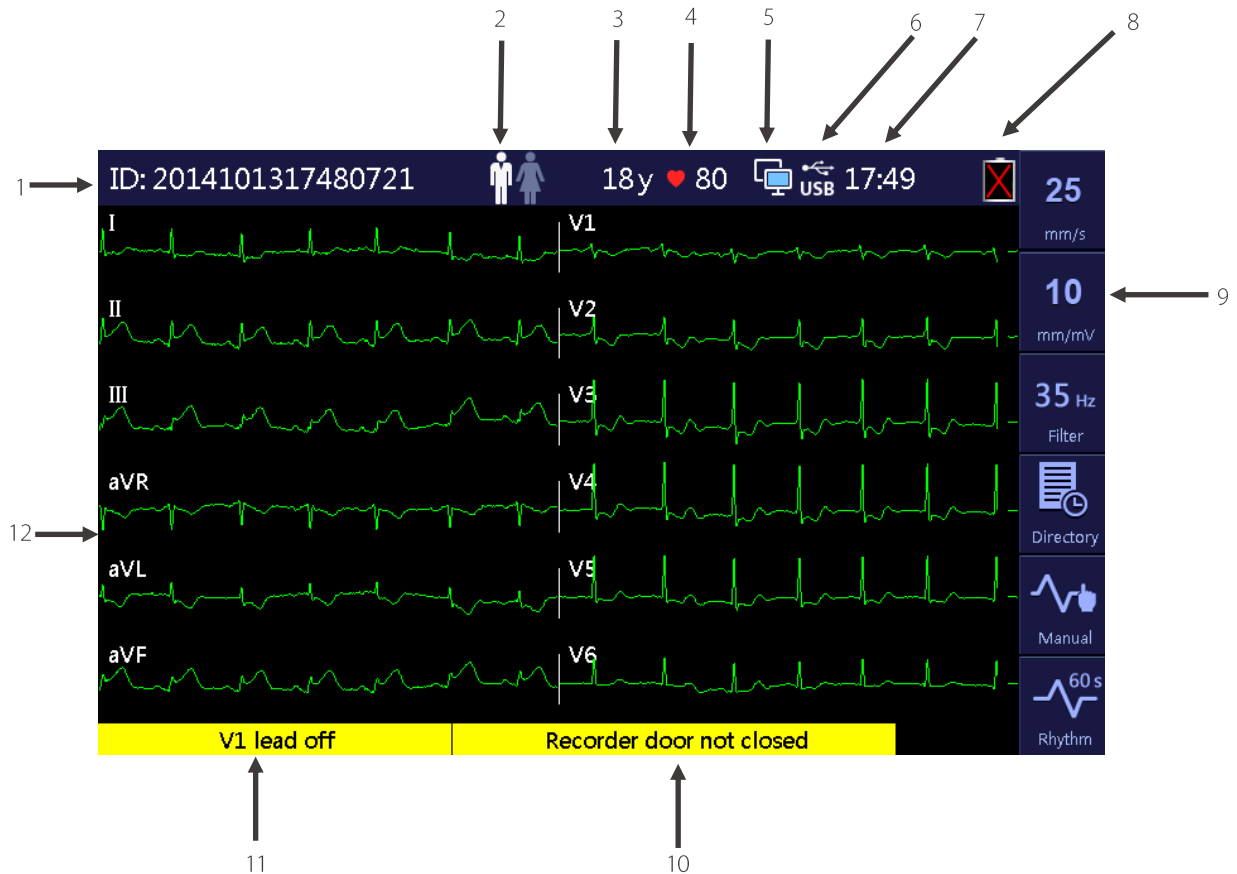
Lead Off

The system will prompt "Lead Off" when electrodes are detached, any of the lead wires are poorly connected with the electrode, or the patient cable becomes detached from the device.

- When any of the limb electrodes or leads are detached, excluding the right leg (N/RL) electrode, the system will respectively prompt "LA Lead Off", "LL Lead Off", or "RA Lead Off".
- When any of the chest electrodes or leads are detached the system will respectively prompt "V(X) Lead Off", in where (X) represents lead 1-6.
- When the right leg (N/RL) electrode or lead is detached, two or more limb leads are detached together, or the patient cable detaches from the equipment, the system will prompt "Limb Lead Off".

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Section 10 Main Screen



1. Patient ID Display
2. Gender icon: the display will show or
3. Age: the unit can be set to [Years], [Months] or [Days]
4. Heart rate
5. Network status icon
6. USB device status icon
7. System time
8. Battery status icon
9. Soft key area: touchscreen keys or labels of soft keys located to the right
10. Message area 2: displays all other messages.
11. Message area 1: displays "Lead Off" and noise information
12. Waveform display area

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Setting the Waveform

Before starting an ECG measurement, configure the ECG waveforms:

- Press the first soft key to adjust the current waveform speed.
- Press the second soft key to adjust the current waveform gain/size.
- Press the third soft key to adjust the current frequency of the muscle artefact filter.

You can also configure the ECG waveforms by accessing the **[Waveform Setup]** menu, however be aware that any changes made in the menus will be retained when the device is switched off, whilst changes made with function keys will be reset to the default configuration.

Setting ECG Report

The format and content of the ECG report is configurable in the **[Report Setup]** menu. Please refer to the ***BeneHeart R12 Operator's Manual*** for a full list of options.

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Section 11 Acquiring an ECG

Auto Measurement

In auto measurement mode, the equipment automatically acquires 10 seconds of 12-lead ECG, starts analysis at the completion of ECG acquisition, then prints the ECG report as per system setup.

To start an auto measurement:

1. Prepare the patient as described in **Section 9: Patient Preparation**.
2. Enter patient information as described in **Section 8: Patient Demographics**.
3. Adjust waveform speed, waveform size, and the frequency of muscle artefact filter as described in **Section 10: Main Screen Overview/Setting the Waveform**.
4. If required, check other waveform and report settings by selecting **[Menu]** → **[Waveform Setup]** and **[Report Setup]**.
5. Press the **[ECG]** key to start an auto measurement.

If the **[Preview]** option is disabled, the equipment automatically prints the ECG report after ECG data is acquired and analysed.

If the **[Preview]** option is enabled, the preview of the ECG report displays. You can then:

- Select the **[Home]** soft key or the **[Esc]** hard key to discard the report and return to the normal screen.
- Select the **[Send]** soft key to send the report to an external device if applicable (see **BeneHeart R12 Operator's Manual** for details).
- Select the **[Edit]** soft key to edit the patient information.
- Select the **[Next Page]** soft key to display the next page of the report, if there is any.
- Select the **[Print]** soft key to print the report.

If the auto save function is disabled, select the **[Save]** soft key to manually save the report to the internal storage.

The equipment automatically stops recording when the ECG report has been printed. You can also press **[Stop]** to interrupt printing.

Manual Measurement

In Manual Measurement mode, the equipment continuously records the ECG waveforms of the selected lead(s) in real time. The manual measurement provides only a printed report. There are no measurement results or diagnoses. You cannot save the report or send it to the external device.

To generate a Manual report:

1. Follow steps 1 to 4 of auto measurement above.
2. Press the **[Manual]** soft key to start recording.
3. Press **[Stop]** to end recording.

In manual measurement mode, press the **[1mV]** soft key to place a 1 mV square wave on the printout.

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Rhythm Measurement

In rhythm measurement mode, the device acquires 60 seconds of data then prints the waveforms of the rhythm lead. The rhythm measurement provides only a printed report. There are no measurement results and diagnoses. You cannot save the report or send it to the external device.

You can change the lead to be recorded in the rhythm report by selecting **[Menu]** → **[Report Setup]** → **[Rhythm Lead]**.

To generate a rhythm report:

1. Follow steps 1 and 2 of **auto measurement** above.
2. Set **[Rhythm Format]** and **[Rhythm Lead 1]**, plus **[Rhythm Lead 2]** and **[Rhythm Lead 2]** if appropriate, in the **[Report Setup]** menu.
 - If you set **[Rhythm Format]** to **[One Lead]** the waveform of the selected rhythm lead displays in 6 cascade lines, with each line including 10 seconds of waveforms on the report.
 - If you set **[Rhythm Format]** to **[Three Leads]** the waveforms of the selected rhythm leads display in 3 cascade lines, with each line including 20 seconds of waveforms on the report.
3. Press the **[Rhythm]** soft key to start a rhythm measurement.

The device will start acquiring ECG data and display a countdown. When 60 seconds of data has been collected printing will start automatically.

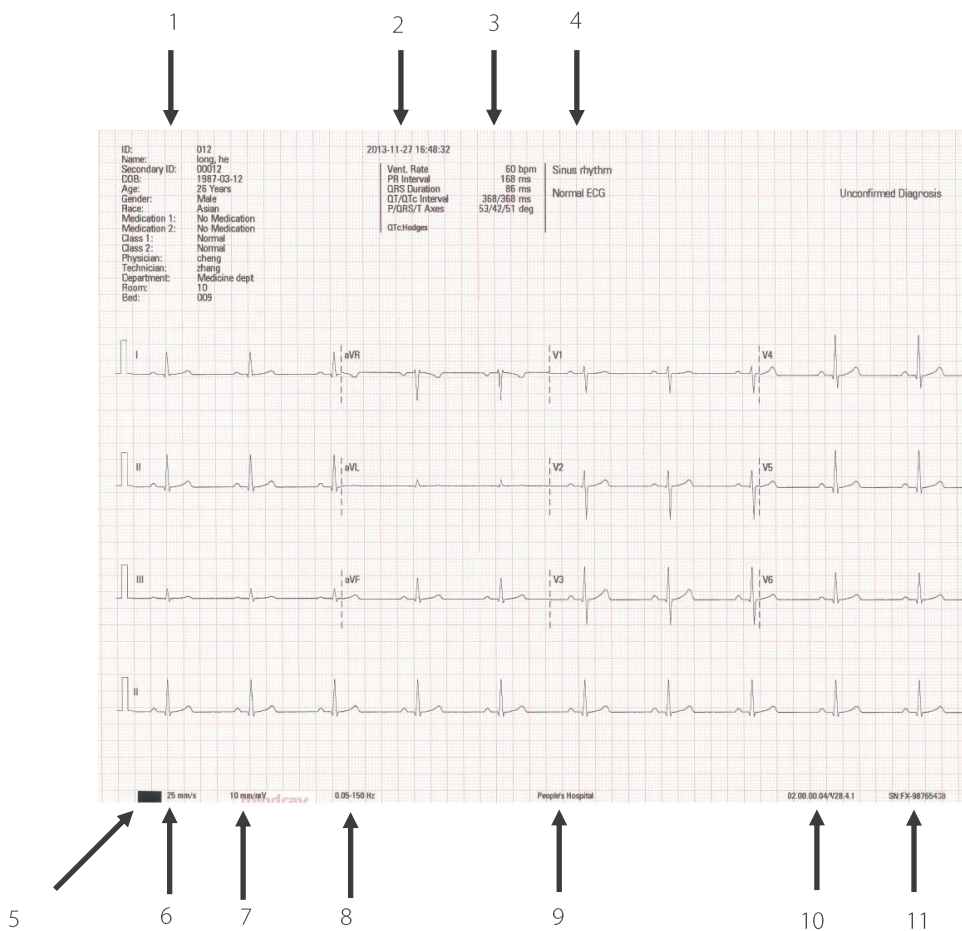
The rhythm mode automatically stops when the report is finished. You can also press the **[Stop]** key to manually interrupt it.

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Section 12 ECG Reports

Auto Measurement ECG Report

The format and contents of the ECG reports are configurable. Refer to **BeneHeart R12 Operator's Manual** for details. The following is a sample of the standard auto measurement recording with default configuration.



1. Patient information
2. Time of acquisition
3. Measurements
4. Diagnosis statements
5. Black mark (for alignment)
6. Paper speed
7. Gain
8. Frequency range
9. Institution name
10. System software version/algorithm version
11. Equipment ID

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Resting 12 Lead ECG Analysis

The device is configured with the University of Glasgow algorithm to provide an interpretation of the resting 12-lead ECG. The system automatically starts analysis at the completion of ECG acquisition.

Both algorithms provide the following analysis:

Measurements

- Vent. Rate (bpm)
- PR Interval (ms)
- QRS Duration (ms)
- QT/QTc Interval (ms)
- P/QRS/T Axes (°)
- RV5/SV1 (mV)*
- RV5+SV1 (mV)*

Critical Values

- Consider Acute STEMI
- Acute MI/Ischemia
- Extreme Tachycardia
- Extreme Bradycardia
- Significant Arrhythmia
- Prolonged QTc Interval

Diagnoses

Median Complex*

Measurement Matrix*

* Starred values are not set as default and, if required, should be selected from **[Report Analysis Setup]**, within the **[Report Setup]** menu.

For full details of resting 12-lead ECG analysis with the Glasgow algorithm refer to ***12-Lead ECG Interpretive Program Physician's Guide***.

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Section 13 Managing Patient Archives

If you have enabled **[Auto Save]** in the **[File Management]** menu, the system automatically creates and saves a patient file at the completion of each auto measurement. You can search, review, export, delete and print historic archives.

The internal memory can store up to 800 ECG reports.

Print a Copy

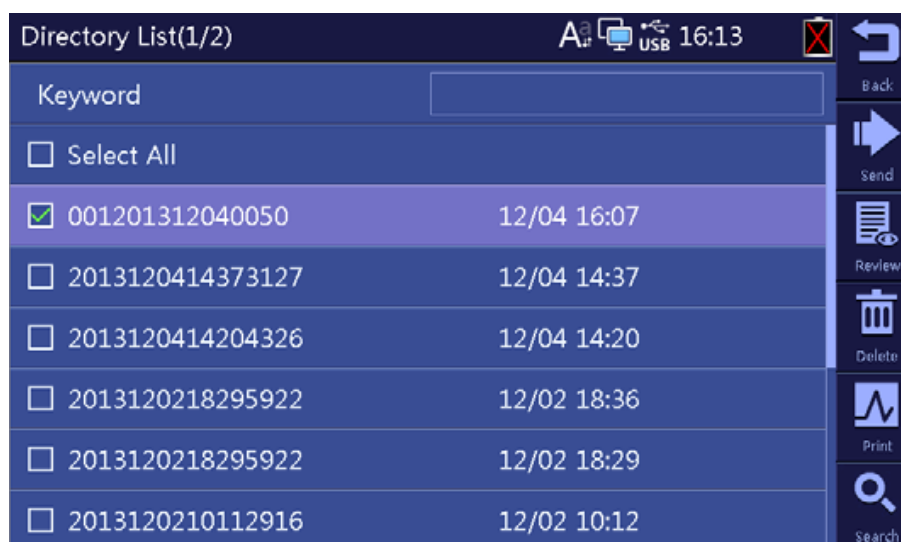
A copy of the last Auto Measurement or Rhythm report report may be printed by pressing the key on the keyboard, unless the device has been switched off since the report was originally generated.



You can copy the report using the current configuration or change the settings before printing another copy.

Accessing the Directory

In the normal screen, select the **[Directory]** soft key to enter the **[Directory List]**. The **[Directory List]** shows patient records in time sequence with the latest on the top.



- Scroll through the list using the arrow keys on the keyboard.
- Select the required report with the **[Enter]** key on the keyboard, or by using the touchscreen.
- Choose to go **[Back]** to the normal screen, or you can **[Send]**, **[Review]**, **[Delete]** or **[Print]** the selected report using the respective soft keys.

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Search for a Report

You can also search patients from the Directory List:

- Select the [**Search**] soft key and enter a keyword or Patient ID (a partial ID can also be entered).
- Select [**Search**] again to start searching.

You will then see a list of all patient records that meet the criteria.

Exporting Files

In certain circumstances it is possible to export records from the device. Please see ***BeneHeart R12 Operator's Manual*** for details.

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Section 14 Troubleshooting

Please see ***BeneHeart R12 Operators Manual*** for a full list of messages.

Symptom	Possible Cause	Corrective Action
The device does not power up	<ol style="list-style-type: none"> 1. The equipment is not connected to the AC mains or the power cord is poorly connected 2. External power supply problems, such as damaged power cord or AC power outlet 3. Battery is not installed or has no charge when the AC mains is not connected 	<ol style="list-style-type: none"> 1. Verify the equipment is turned on. Verify the equipment is properly connected to the AC mains 2. Verify the equipment receives power from the AC mains. Replace the power cord or AC power outlet if necessary. 3. Verify the battery is installed and has sufficient charge. Otherwise, connect the equipment to the AC mains to run the equipment and charge the battery.
The display is completely blank	<ol style="list-style-type: none"> 1. The equipment is in the Standby mode 2. The equipment power is off 	<ol style="list-style-type: none"> 1. Press any key to exit Standby 2. Press the power switch to turn on the equipment
The display is frozen	Software failure	<ol style="list-style-type: none"> 1. Press and hold the [Power] switch for 10 seconds to forcibly shut down the equipment 2. Restart the equipment 3. See your Medical Engineering Department should you require further assistance
No response to keystroke	<ol style="list-style-type: none"> 1. One or more keys on the keyboard are being pressed and held 2. Software failure 	<ol style="list-style-type: none"> 1. Verify no other key is pressed and held 2. Press and hold the [Power] switch for 10 seconds to forcibly shut down the equipment. Restart the equipment.

These guidelines do **NOT** replace the instructions for use and all users should refer to the appropriate **Operator's Manual** for detailed instructions. The Illustrations may not necessarily reflect the setup or data displayed on your device.

<p>ECG data displays unacceptable noise</p>	<ol style="list-style-type: none"> 1. Patient movement 2. Improper filter setting 3. Poor skin preparation 4. Electrode problem 5. Patient cable problem 6. Wrong accessories are used or mix electrode types and brands 	<ol style="list-style-type: none"> 1. Request the patient lies still during ECG acquisition 2. Check the settings of the filters are appropriate 3. Prepare the patient before ECG acquisition 4. Verify the electrodes are applied correctly. Check for defective or expired electrodes. 5. Check for defective, broken or disconnected patient cable 6. Use specified accessories. Do not mix electrode types or brands.
<p>The recorder does not work</p>	<ol style="list-style-type: none"> 1. Paperless recording is enabled 2. Recording paper is not loaded 3. Recorder door is not properly closed 4. Print head is too hot 5. Recorder is disabled due to depleted battery 	<ol style="list-style-type: none"> 1. Select [Setup] → [Report Setup] Disable [Paperless Recording] 2. Verify the recording paper is properly loaded 3. Verify the paper tray is clicked shut 4. Wait till the print head cools down 5. Check whether the message "Battery depleted! Recorder disabled." is presented. If yes, connect the equipment to the AC mains to charge the battery.
<p>Paper jammed or misaligned</p>	<ol style="list-style-type: none"> 1. Unapproved paper is used 2. Recording paper is not properly loaded 	<ol style="list-style-type: none"> 1. Use approved recording paper. Remove paper and tear off the jammed part. 2. Reload the paper as described in Section 4: Device Setup
<p>Partially missing printout or printout not clear</p>	<ol style="list-style-type: none"> 1. Dirty print head 2. Some thermal points on print head are damaged 	<ol style="list-style-type: none"> 1. Clean the print head as described in Section 15: Care and Maintenance 2. If the problem persists, contact your service personnel
<p>Some or all leads have no waveforms</p>	<ol style="list-style-type: none"> 1. Defective or broken ECG cable 2. ECG cable is not connected 3. Electrodes are not applied, or lead-wires are dragged or trapped 	<ol style="list-style-type: none"> 1. Replace the ECG cable with a new one 2. Check the ECG cable is properly connected 3. Verify electrodes are correctly applied, as described in Section 9: Patient Preparation

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<p>The equipment automatically shuts down</p>	<ol style="list-style-type: none"> 1. Auto shutdown is enabled 2. The battery is depleted when the equipment runs on battery power 	<ol style="list-style-type: none"> 1. Check the setting of [Auto Shut Down] by selecting [Setup]→[Basic Setup] 2. Connect the equipment to AC mains to run the equipment and charge the battery
<p>The screen display is too dark to be seen clearly</p>	<p>The setting of brightness is low</p>	<p>Adjust screen brightness in the [Basic Setup] menu</p>

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Section 15 Care & Maintenance

Cleaning and Disinfecting

Keep your equipment and accessories free of dust and dirt. To avoid damage to the equipment, follow these rules:

- Always dilute the cleaning and disinfecting agent according to the manufacturer's instructions or use lowest possible concentration
- Do not immerse any part of the equipment into liquid
- Do not pour liquid onto the equipment or accessories
- Do not allow liquid to enter the case
- Never use abrasive materials (such as steel wool or silver polish), or erosive cleaners (such as acetone or acetone-based cleaners)

Recommended cleaning agents for the equipment are:

Sodium hypochlorite bleach (diluted)

Hydrogen peroxide (3%)

Ethanol (75%)

Isopropanol (70%)

For the recommended cleaning agents for the reusable accessories, refer to the instructions for use delivered with the accessories.

Cleaning the Equipment

Your equipment should be cleaned on a regular basis. Before cleaning the equipment, consult your hospital's regulations.

The recommended cleaning agents for the device are water and mild soap.

Do not use any of the following materials to clean the equipment as damage may result:

- Organic solvents except ethanol
- Ammonia-based solvents
- Acid or alkaline cleaning agents such as sodium hypochlorite and peroxide solvents
- Abrasive cleaning agents

Cleaning the BeneHeart R12 Device:

1. Shut down the equipment and disconnect the power cord, accessories, and other devices that are connected with the equipment.
2. Dilute the mild soap in water to make a cleaning solution.
3. Soak a clean and soft cloth in the solution and wring out excess solution.
4. Thoroughly wipe the surface of the equipment with the damp cloth, avoiding the connectors.
5. Do not drip the solution or any liquid on the keyboard and the opening of the thermal recorder.
6. Dry the surface with a clean cloth or paper towel.

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Cleaning Patient Cables and Lead Wires

1. Remove cable and lead wires from the equipment before cleaning.
2. Gently wipe the cables and lead wires with a soft cloth dampened with the cleaning agent, avoiding the metal connectors.
3. Wipe off excess moisture with a dry cloth.
4. Dry the cables and lead wires in a ventilated, cool place.

Cleaning the Thermal Print Head

1. Turn off the device.
2. Open the recorder door and remove recording paper.
3. Gently wipe the print head with cotton swabs, dampened with water or ethanol, to remove the dust and foreign particles.
4. Wipe off excess moisture with dry cotton swabs.
5. When the print head is completely air dried, reload the recording paper and close the recorder door.

Printing quality may be affected by a dirty print head. Clean the print head once per month, or as needed. Check the printout to ensure the printing is legible and dark. Light printing may indicate a dirty print head.

Disinfecting

Disinfection may cause damage to the equipment and is therefore not recommended for this device, unless otherwise indicated by your hospital's servicing schedule. Cleaning the device before disinfecting is recommended.

The recommended disinfectant for the equipment is 75% ethanol.

For recommended disinfectant agents for the reusable accessories refer to the instructions for use, delivered with the accessories.

Sterilisation

Unless otherwise specified in the instructions for specific accessories, do not sterilise the equipment.

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