
Heart⁺ResQ™

User Manual & Warranty Registration

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Device manufacturer



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Abstract

Heart+ResQ™ (NT-381, NT-381.C) is an Automated External defibrillator which restores a normal heartbeat in patients with sudden cardiac arrest.

Heart+ResQ™ (NT-381, NT-381.C) is an emergency medical device.

Before using this product, please read carefully the safety precautions and instructions for proper usage.

Heart+ResQ™ (NT-381, NT-381.C) is a medical device which must be tracked and monitored to ensure optimal performance and operability.

If the Heart+ResQ™ (NT-381, NT-381.C) is sold, donated, lost, stolen, exported, or destroyed, please notify NANOOMTECH CO., LTD or your local distributor.

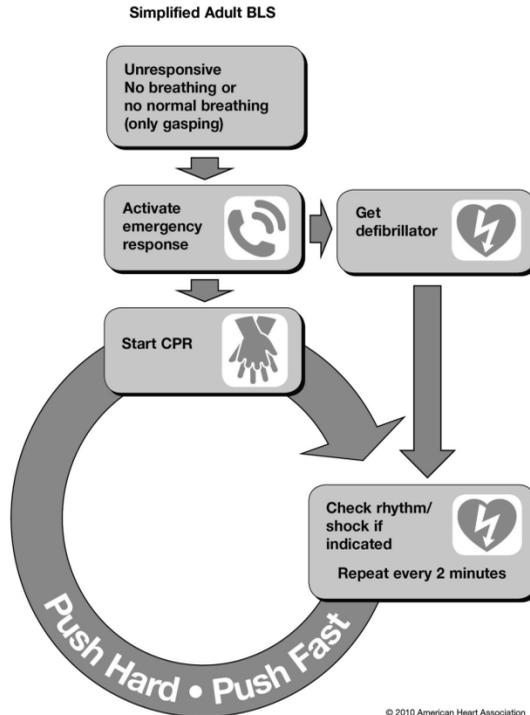
The following visuals are used in this manual to help encourage safe and proper usage and maintenance of the product.

	Indicates possibility of a potentially dangerous situation resulting in death or severe injury in the case where instructions are not followed.
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	Indicates possibility of injury or product damage that results in the breach of warranty agreement.
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	Indicates current manufacturer policy for proper use of the product and accessories.
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Simplified CPR



Simplified adult BLS algorithm¹

- The recommended compression rate is at least 100 compressions per minute.
- Be sure to achieve the full compression depth of at least 5cm (2 inches) for adult patients.
- For children, be sure to achieve the full compression depth, which should be at least 1/3 of chest anteroposterior diameter of

¹ Source : 2010 American Heart Association (AHA) guideline for CPR and cardiovascular first aid.

approximately 4cm (1.5inch) for infants and approx. 5cm (2inch) for the child.

- Achieve enough compression speed and depth, allow the chest to recoil completely after each compression, minimize interruptions in chest compression, and refrain from excessive artificial respiration.
- Perform the chest compression before initiating artificial respiration. (Perform in order of chest compression 30 times, then followed by artificial respiration 2 times.)

Section I

Product Introduction

Product Information

Product Description

Heart⁺ResQ™ (read “HeartPlus ResQ”) is an AED (Automated External Defibrillator) providing defibrillation treatment for quick resuscitation of SCA (Sudden Cardiac Arrest) patient. This product is a portable one operating on batteries. It is reasonably light and can be operated even by the user who receives minimal or no education/training on the use of the product through voice commands that guides the user through the operation sequence.

SCA (Sudden Cardiac Arrest) is the cessation of normal circulation of the blood due to the failure of the heart. SCA can occur to anyone at anytime and anywhere. SCA patients do not show any warning signs or symptoms. Some individuals are at a higher risk of suffering from SCA than others due to hereditary or other reasons.

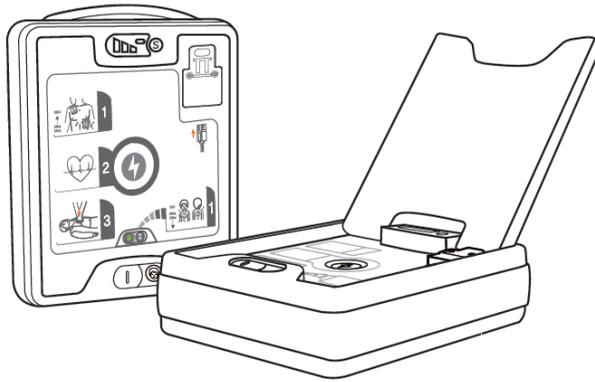
When to Use

- Patient does not respond to voice.
- Patient has no reaction even when shaken.
- Patient does not breathe normally.

If you suspect that the patient shows the above symptoms, follow the voice commands after turning on this product at every stage (attaching electrode pad, shock or no shock, CPR).

Product User

Heart⁺ResQ™ should be used by a person who has been educated on the use of AED (Automated External Defibrillator) and CPR (Cardiopulmonary Resuscitation).

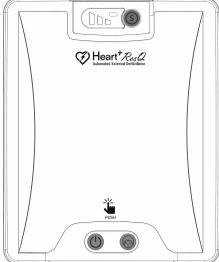


Product Name: AED

Brand Name: Heart+ResQ™

Model Name: NT-381, NT-381.C

Product Appearance:

Option Type	NT-381	NT-381.C
Front visual		
Size (mm)	220(W) X 282(L) X 80(H)	220(W) X 282(L) X 70(H)
Weight (kg) (Incl. battery)	2.1	2.0

Product Specification and Function

<p>Defibrillator</p>	<ul style="list-style-type: none"> • Discharge Current Waveform: BTE (Biphasic Truncated Exponential) • Discharge Time: Automatically adjusted energy for patient impedance • Output Energy: <ul style="list-style-type: none"> - 150J (for adult, load impedance of 50) - 50J (for infant, load impedance of 50) • Patient Insulation: BF Type  • Charging period: About 9 seconds after the voice prompt "Performing an electric shock" • Operation Mode: AED (automated external defibrillator), which can analyze ventricular fibrillation • Change to Pediatric Mode: Hold Infant toggle button for about 2 seconds.
<p>ECG</p>	<p>Induction Method of ECG: LEAD II</p>
<p>Battery pack</p>	<ul style="list-style-type: none"> • Type: Non-rechargeable Lithium battery • Voltage: DC 12V / 4,200mAh • Capacity: At least 180 shocks • Operating time: 20 hours • Size: 164(W) X 54(L) X 22(H)mm • Weight : 260g • Warranty: 5 years (Sealed storage at room temperature)

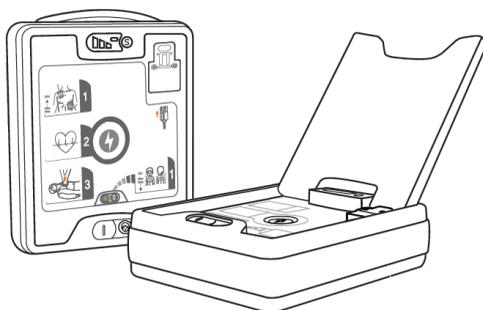
Electrode pads	<ul style="list-style-type: none"> • Disposable • Size: 125(W) X 95(L)mm • Area: 86.44cm² (PE Foam, Hydrogel) • Wire length: 1.5m±20% • Attachment point shown in pictures on electrode pads. • Composition: composed of two electrodes • Warranty: About 2 years
Alarm and voice Prompts	<ul style="list-style-type: none"> • Voice prompts of all procedures for using the equipment. • Voice prompts of all procedures for first aid to the patient. • Voice prompts for the self-test result.
Composition	<ul style="list-style-type: none"> • A main unit of the equipment • Battery pack • Electrode pads
Protection function	<ul style="list-style-type: none"> • In case that electrode pads are not attached to the patient, defibrillation shock in process is stopped. • If defibrillation shock does not come into operation within 20 seconds after its preparation is ready, defibrillation shock energy is automatically discharged internally. • Over-discharge protection circuit of defibrillation shock energy • Safety control circuit to prevent a malfunction of the electric shock waveform control circuit

Storage and management of data/event	<ul style="list-style-type: none">• Stored content:<ul style="list-style-type: none">- Electrocardiogram (ECG) analysis record- The number of defibrillation shocks- Ambient sound during operation of the product- Self-test times and result- Time and date of product use• Storage time:<ul style="list-style-type: none">- Total of 500 ECG analysis recordings- Surrounding sound: Max. 15 minutes (total 4 cases)- Self-test result: Max. 3,000 cases• Data communication: Bluetooth• Data storage:<ul style="list-style-type: none">- embedded memory
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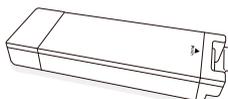
Set Configuration

The product is composed of a portable main unit inside the carry bag, a battery pack and electrode pads.

Heart+ResQ™ Main unit



Consumables



Battery pack



Electrode pads

Other consumables



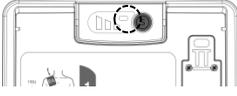
Towel

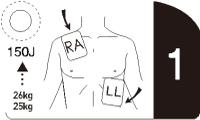
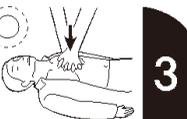
Product Characteristics

- User friendly.
- Decides if it will give a defibrillation shock to the patient or not after analyzing the patient's ECG automatically.
(Defibrillation "Shock Button" must be pressed to deliver an electric shock.)
- A non-rechargeable type, lithium battery is used.
- Electrode pads can be used on both Adult and Pediatric patients.
(Pads attachment area is different for adults and infants/children)
- ECG analysis is recorded only during analysis (max. 500)
- Stored data can be transmitted to a PC through the "NT-MPR" PC management program.
- Communication to PC is possible via BLUETOOTH.
- Ambient sound can be stored for a maximum of 4 cases, 15 minutes each.
- All operation procedures including CPR are guided by clear voice commands.
- Self-test function checks integrity of circuits.
- Battery condition check in real time.
(In the case of normal operating state, the Status Check LED (at upper right side of battery power level bars) blinks every 7 seconds.)

	BLUETOOTH USB Dongle should be purchased if BLUETOOTH hardware is not installed on legacy PC.
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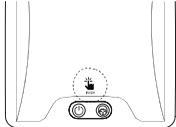
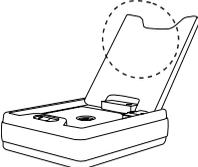
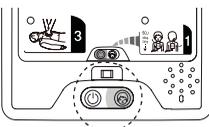
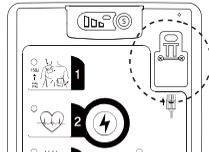
Display Details

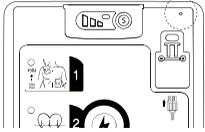
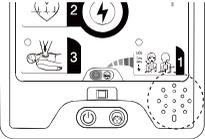
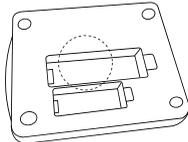
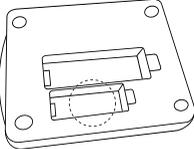
Product State	LED State	Description
<p>Standby Mode</p>		<p>Status Check LED (Green) When battery power is sufficient and device is functioning normally, the Status Check LED flashes every 7 seconds.</p>
<p>Normal State</p>		<p>Normal state light color (Green) When the product is operating normally after powering on, the green light stays on.</p>
<p>Error Mode</p>		<p>Error indicate light (Red) When the product is having any problems, a red light flashes every 3 seconds.</p>
<p>Battery Status Bars</p>		<p>Battery state indicate light When powered on, LED lights are on according to the battery capacity.</p>

Product State	LED State	Description
Adult mode		<p>Adult mode, energy is 150J*</p> <p>*Impedance adjusted.</p>
Pediatric mode		<p>Pediatric mode, energy is 50J*</p> <p>*Impedance adjusted.</p>
Pads attachment		<p>Attach the electrode pads. (Pads attachment lamp flashes)</p>
ECG Analysis		<p>Analyze ECG. (ECG analysis lamp flashes)</p>
CPR		<p>Commence CPR. (CPR lamp flashes)</p>

Name and Function of Components

No	Item/Shape	Function
①		<p>Main Panel</p> <p>Main panel shows all necessary steps for resuscitation. Appropriate section lights up at each step of operation.</p>
②		<p>Defibrillation shock button (Red)</p> <p>If the red button is flashing, the machine advises and is ready to deliver a defibrillation shock.</p>
③		<p>Power button</p> <p>It is an ON/OFF button.</p> <p>Default emission energy is 150J (Adult Mode).</p>
④		<p>Pediatric mode button</p> <p>It is a toggle button to be pressed after device is powered on for use on patients weighing under 25kg.</p> <p>Emission energy is 50J (Pediatric)</p>
⑤		<p>Setting button</p> <p>Self-diagnostics check may be initiated to test integrity of system or connection to PC mode.</p>

⑥		<p>NT-381: Push Open</p> <p>Open the cover by pushing the cover at the location indicated by the hand icon.</p>
⑦		<p>NT-381.C: Lift Open</p> <p>Lift the cover of the bag to expose the main panel.</p>
⑧		<p>NT-381: Main unit cover</p> <p>When the cover is opened, the machine turns on automatically. Electrode pads should be pre-attached and placed under the cover.</p>
⑨		<p>NT-381.C: Carry Bag Front Cover</p> <p>Electrode pads should be pre-connected and placed in the inner-mesh pocket of the cover.</p>
⑩		<p>Slide for Toggle Button</p> <p>Slide to left to reveal the toggle button for Pediatric mode. (※ Detailed use method, please refer to the Chapter 2.)</p>
⑪		<p>Electrode pad connector port</p> <p>Connection point for main unit and disposable electrode pads.</p>

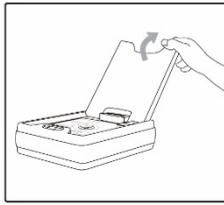
⑫		<p>Microphone To record ambient sound.</p>
⑬		<p>Speaker Voice commands prompts user through the operation process. Audible warnings for when the machine has any problem.</p>
⑭		<p>Electrode pads Receive the ECG signal from the patient to the unit and for delivering the defibrillation shock.</p>
⑮		<p>Battery pack Non-rechargeable lithium-ion battery</p>
⑯		<p>Battery pack compartment Battery pack compartment where the battery is inserted.</p>
⑰		<p>Communication module battery pack compartment (Optional) Communication module battery pack compartment for supplies power to the communication module. (Blank cartridge inserted when there is no communication module.</p>

<p>18</p>		<p>Towel Used for wiping out any moisture or liquid from the pads attachment area.</p>
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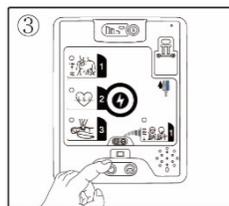
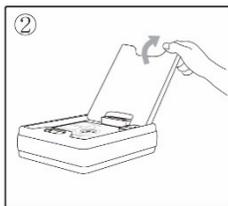
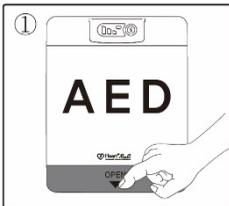
Section II Product Usage

Simple Guide for Use

1. NT-381: Press the "PUSH" hand icon to open and turn on the Heart+ResQ™.



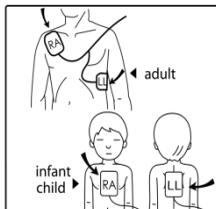
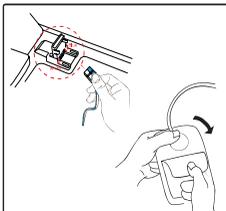
NT-381.C: Lift the front cover of the carry bag to open the Heart+ResQ™. Hold the power button (⏻) for at least 1 second to power on in Adult Mode.



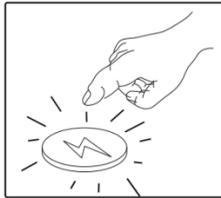
(※ In case the patient is an infant weighing less than 25kg, press the Pediatric toggle button (👶) after powering on in Adult Mode.)

2. Put the electrode pads on the patient as indicated on pads themselves.

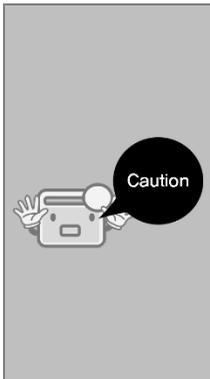
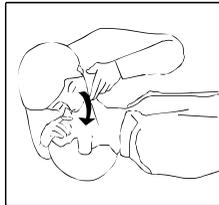
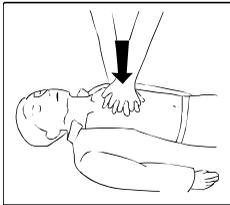
(※ If the electrodes pads are not connected with the main unit, connect the electrode pads connector to the main unit before attaching the pads)



3. Press defibrillation shock button () by voice prompt.



4. Commence CPR (30 chest compressions and 2 rescue breaths).



- Do not delay treatment.
- Follow the voice prompt
- If the victim is infant/child, please refer to the "Detailed Instructions (Pediatric)" section
- Adult refers to person over 8 years old (25kg)
- Pediatric refers to person at or under 8 years old or weighing less than (25kg)
- Infants less than 12 months of age is not recommended to receive defibrillation shock

How to Install a Battery Pack

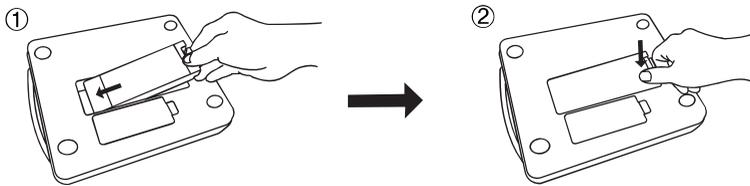
Install a battery pack

1) How to install a battery pack

Use Heart+ResQ™ battery pack provided by NANOOMTECH Company.

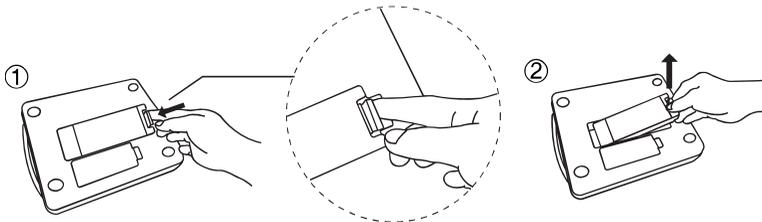
1. Place the top end of the battery into the top of the compartment on the back of the Heart+ResQ™.
2. Then firmly press down the bottom (latch) end of the battery into the compartment, until it clicks into place.

(See illustration at below and follow the arrow)



2) How to separate a battery pack

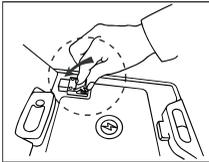
Follow the illustration at below, lift the latch and pull the battery pack.



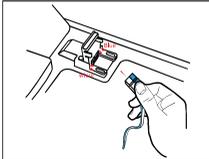
How to Install Electrode Pads

Electrode pads installation

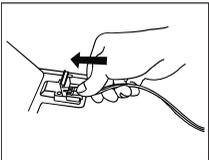
How to install electrode pads



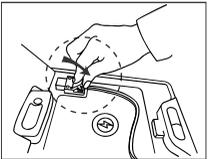
Lift the electrode pads connector protective cover.



Plug the pads cable connector into the matching colored connector port on the Heart+ResQ™.
(Blue connector-Blue port and white connector-white port)



Firmly press the connector to the connector port until it clicks into place.

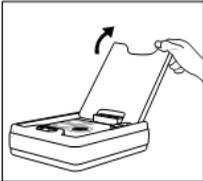


Shut the electrode pads connector protective cover by pushing down until it clicks into place.

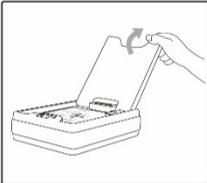


- Don't open the sealed pads pouch until ready to immediately apply to the patient.
 - Once you opened the storage envelope or used the electrode pads, replace with a new one.
 - Store the unopened pads pouch and keep it connected with the main unit.
 - Store new pads in mesh pocket inside carry bag.
-

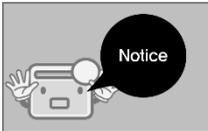
Detailed Instructions (Adult)



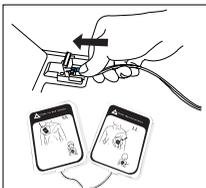
1. NT-381: Heart+ResQ™ turns on automatically when cover is opened by pushing the lower part of the cover.



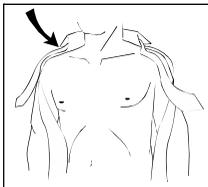
NT-381.C: Lift the cover of the Heart+ResQ™ carry bag. Then push the power button () to turn on the AED in Adult Mode (default).



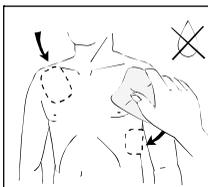
- Check the power button light () is on.
- "Adult" refers to person weighing over 25kg.



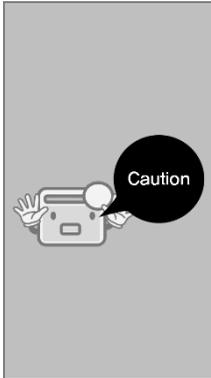
2. For NT-381.C, the electrode pads should be inside mesh pocket of the carry bag front cover. If the electrode pads are not connected with Heart+ResQ™, plug the pads connector into connector port with matching colors (blue to blue, white to white).



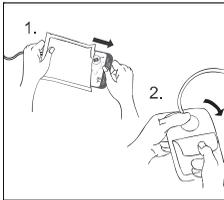
3. Remove the patient's top clothing.
If necessary, rip or cut off the clothing to expose patient's bare chest.



4. If there is any liquid or moisture on the patient's body before attaching an electrode pads, dry the body with a towel.

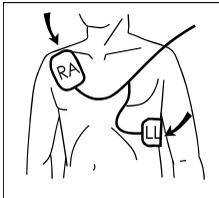


- If the jacket was not taken off from the patient, or water is not adequately removed from the patient's body, Heart+ResQ™ might not analyze the patient's heart rhythm properly.
- Secondhand shock is possible, so stay clear of patient when administering an electric shock.
- Make sure that the electrode pads are attached.
- A shock energy might not be delivered to the patient's heart if pads not properly attached.



5. 1) Open the pads pouch and take out the electrode pads.

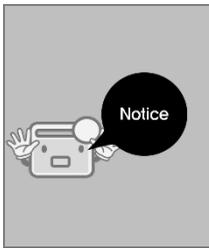
- Voice prompt: "Peel one pad from its liner..."
(※ Make sure the electrode pads connector is connected to the Heart+ResQ™)



6. Place one of the pads on the patient's bare skin exactly as shown in the picture. Press the adhesive portion of the pad down firmly. Then repeat this with the other pad.

(※ Proper attachment of pads is critical)

- Voice prompt: "...and attach it to the patient..."
- Lamp state
 - Before attaching electrode pads: Electrode pads attachment lamp () flickers.
 - After correct attachment of electrode pads: Electrode pads attachment lamp () will be ON.



For women

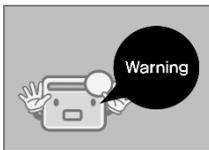
As seen in the picture, check the placement for attaching electrode pads and adhere them firmly on the body.

(※ The position of the electrode pad attachment is critical.)



7. Keep away from the patient as instructed by the voice command.

- Voice prompt: "Stay clear of patient"



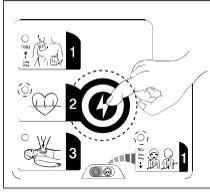
User must stay clear of the patient and Heart+ResQ™ when analyzing the patient's state.



8. Heart+ResQ™ analyzes the electrocardiogram (ECG).

Voice prompt: "Analyzing ECG... analyzing..."

- Operational state indicator lamp: Lamps which indicate the attachment of an electrode pads () is lit and the electrocardiogram analysis lamp () flashes.
- After the analysis of electrocardiogram (ECG) is complete, ECG analysis lamp is ON.



9.1. Situation requiring defibrillation shock

- Voice prompt : “Shock advised... charging now”
[charging siren]
- Lamps to indicate the operation state: electrode pads (), electrocardiogram () lamp are lit.

9-1-1. After loading of the electric shock energy is complete

- Voice prompt : “Push the flashing shock button”
- Lamp state: Electrode pad attachment lamp (), and ECG analysis lamp () are ON, and electric shock button () flickers.

9-1-2. Delivering electric shock energy

When electric shock button lamp () flicks, the electric shock energy will be delivered to the patient if you press the electric shock button.

- Voice prompt: “Electric shock is done.”
- Lamp state: Electrode pad attachment lamp () and ECG analysis lamp () will be ON.



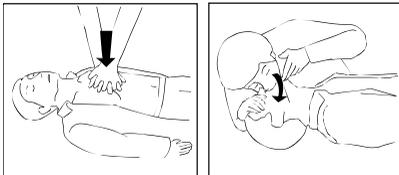
- You must keep away from the patient because if you touch the patient while pushing the defibrillation shock button, you might get a defibrillation shock.
- If you do not push the defibrillation shock button within 20 seconds, defibrillation shock procedure will be cancelled.
- If defibrillation shock procedure is bypassed, move on to the CPR procedure.

9-2. Situation not requiring a defibrillation shock

In case that a defibrillation shock is not required, even if you push the defibrillation shock button, a defibrillation shock will not be applied. Immediately commence CPR on the patient.

- Lamps which indicate operational state: The attachment of the electrode pads () and the electrocardiogram analysis lamp () are lit. Voice prompt: "Shock not advised."

10. Cardiopulmonary resuscitation should be performed.



10-1. Cardiopulmonary resuscitation should be performed without delay after a defibrillation shock is delivered.

- Voice prompt: "Use both hands... to push down at the center of the

chest", [metronome] 30 chest compressions, ["Whoop-"] 2 rescue breaths.

- Lamps which indicates the operational state: The attachment of electrode pads () and the electrocardiogram analysis lamp () are on, and cardiopulmonary resuscitation lamp () flashes.

10-2. An electrocardiogram of the patient is not analyzed while the cardiopulmonary resuscitation is being performed.

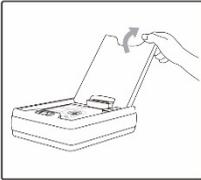
- Upon completion of five cycles of the cardiopulmonary resuscitation, Heart+ResQ™ automatically will start the electrocardiogram analysis again and the electrocardiogram data will be stored automatically.

10-3. Continue to perform the cardiopulmonary resuscitation until emergency response personnel arrive.

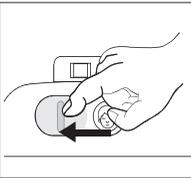
Detailed Instructions (Pediatric)



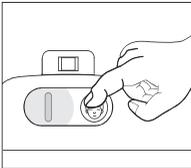
1. NT-381: Heart+ResQ™ turns on automatically when cover is opened by pushing the lower part of the cover.



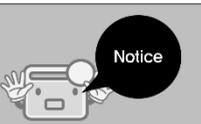
NT-381.C: Lift the cover of the Heart+ResQ™ carry bag. Then push the power button () to turn on the AED in Adult Mode (default).



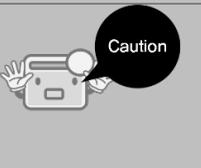
2. Move the protective cover for the Pediatric toggle button by sliding to the left.



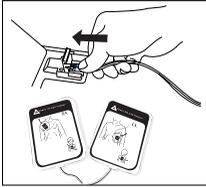
3. Press the Pediatric toggle button and hold it for three (3) seconds until the button lights on.



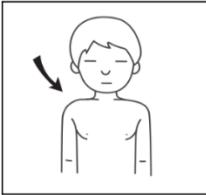
"Infant/Child" refers to person weighing less than 25kg.



In case the patient is actually an Adult, Heart+ResQ™ must be turned off by holding the regular power button (), then turned on again.



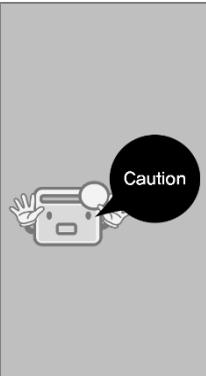
4. Electrode pads should be inside mesh pocket of the carry bag front cover. If the electrode pads are not connected with Heart⁺ResQ™, plug the pads connector into connector port with matching colors (blue to blue, white to white).



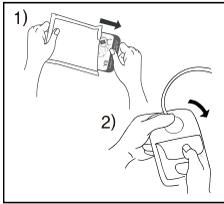
5. Remove the patient's top clothing.
If necessary, rip or cut off the clothing to expose patient's bare chest.



6. If there is any liquid or moisture on the patient's body before attaching an electrode pads, dry the body with a towel.



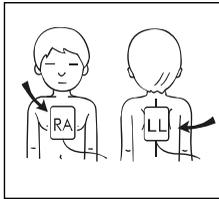
- If the jacket was not taken off from the patient, or water is not adequately removed from the patient's body, Heart⁺ResQ™ might not analyze the patient's heart rhythm properly.
- Secondhand shock is possible, so stay clear of patient when administering an electric shock.
- Make sure that the electrode pads are attached.
- A shock energy might not be delivered to the patient's heart if pads not properly attached.



7. 1) Open the pads pouch and take out the electrode pads.

- Voice prompt: "Peel one pad from its liner..."
- (※ Make sure the electrode pads connector is connected to the Heart+ResQ™)

8. Place one of the pads on the patient's bare skin exactly as shown in the picture. Press the adhesive portion of the pad down firmly. Then repeat this with the other pad.



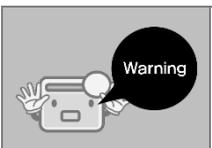
(※ Proper attachment of pads is critical)

- Voice prompt: "...and attach it to the patient..."
- Lamp state
 - Before attaching electrode pads: Electrode pads attachment lamp () flickers.
 - After correct attachment of electrode pads: Electrode pads attachment lamp () will be ON.



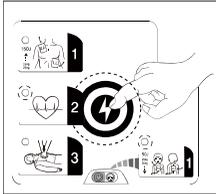
9. Keep away from the patient as instructed by the voice command.

- Voice prompt: "Stay clear of patient"



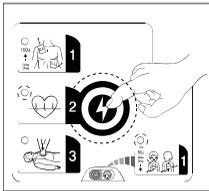
User must stay clear of the patient and Heart+ResQ™ when analyzing the patient's state.

10. Heart+ResQ™ analyzes the electrocardiogram (ECG).



Voice prompt: "Analyzing ECG... analyzing..."

- Operational state indicator lamp: Lamps which indicate the attachment of an electrode pads () is lit and the electrocardiogram analysis lamp () flashes.
- After the analysis of electrocardiogram (ECG) is complete, ECG analysis lamp is ON.



10-1. Situation requiring defibrillation shock

- Voice prompt : "Shock advised... charging now"
[charging siren]
- Lamps to indicate the operation state: electrode pads (), electrocardiogram () lamp are lit.

10-1-1. After loading of the electric shock energy is complete

- Voice prompt : "Push the flashing shock button"
- Lamp state: Electrode pad attachment lamp (), and ECG analysis lamp () are ON, and electric shock button () flickers.

10-1-2. Delivering electric shock energy

When electric shock button lamp () flicks, the electric shock energy will be delivered to the patient if you press the electric shock button.

- Voice prompt: "Electric shock is done."
- Lamp state: Electrode pad attachment lamp () and ECG analysis lamp () will be ON.



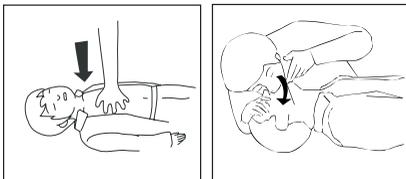
- You must keep away from the patient because if you touch the patient while pushing the defibrillation shock button, you might get a defibrillation shock.
- If you do not push the defibrillation shock button within 20 seconds, defibrillation shock procedure will be cancelled.
- If defibrillation shock procedure is bypassed, move on to the CPR procedure.

10-2. Situation not requiring a defibrillation shock

In case that a defibrillation shock is not required, even if you push the defibrillation shock button, a defibrillation shock will not be applied. Immediately commence CPR on the patient.

- Lamps which indicate operational state: The attachment of the electrode pads () and the electrocardiogram analysis lamp () are lit. Voice prompt: "Shock not advised."

11. Cardiopulmonary resuscitation should be performed.



11-1. Cardiopulmonary resuscitation should be performed without delay after a defibrillation shock is delivered.

- Voice prompt: "Use both hands... to push down at the center of the chest", [metronome] 30 chest compressions, ["whoop-"] 2 rescue breaths.
- Lamps which indicates the operational state: The attachment of electrode pads () and the electrocardiogram analysis lamp () are on, and cardiopulmonary resuscitation lamp () flashes.

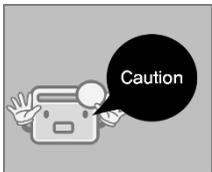
11-2. An electrocardiogram of the patient is not analyzed while the cardiopulmonary resuscitation is being performed.

- Upon completion of five cycles of the cardiopulmonary resuscitation, Heart+ResQ™ automatically will start the electrocardiogram analysis again and the electrocardiogram data will be stored automatically.

11-3. Continue to perform the cardiopulmonary resuscitation until emergency response personnel arrive.

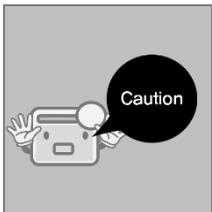
There are 4 types of warning for low battery.

1. If the battery is full, the three battery indicating lights on.
2. If the battery is satisfied, the two battery indicating lights on.
3. If the battery is low, the one battery indicating lights on.
4. If the battery voltage is the lowest,

	<ul style="list-style-type: none">• If the one battery indicating lights on which means the defibrillation shock can be delivered within 10 times, without a moment's hesitation, replace with new one.
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The battery indicating lights off and equipment state indicator flashes red. Until the complete discharge of the battery, the voice guide 3 times at 2hours interval.

- Voice prompt: "The battery is low. Change the battery."

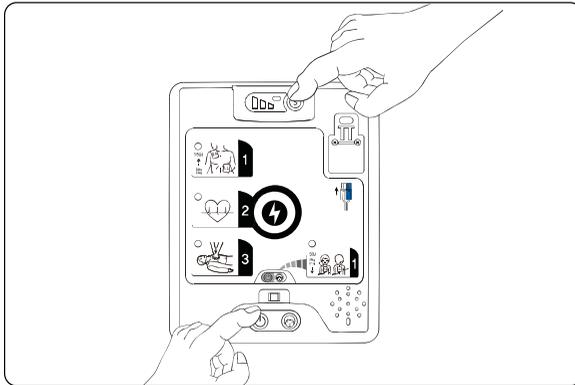
	<ul style="list-style-type: none">• In this situation, it cannot deliver the defibrillation shock.• Replace it with a new battery.• After complete discharge of the battery, Heart+ResQ™ low battery warnings will cease.
--	---

Voice prompts for equipment error

- Voice prompt: "Equipment check is needed."
- Action: Replace the equipment immediately as it cannot be used. Contact customer service center.

PC Communication

1. Make sure the equipment is in the power OFF state.
2. Press both S button () and power button () at the same time for 3 seconds.
3. Steps 1, 2, & 3 indicator lamps will light up simultaneously.



- Connection Method : Heart+ResQ™ is connected to PC via Bluetooth.
4. Find the recorded data using the data management program NT-MPR.

 <p>Notice</p>	<ul style="list-style-type: none">• Connect Heart+ResQ™ to PC wirelessly using Bluetooth.• For detailed instructions on NT-MPR program, please refer to the NT-MPR manual.• Ambient sound of the surroundings (recorded during AED use) can be stored for 4 cases for 15 minutes. After recording 4 cases, new data will automatically overwrite old data.
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Section III Guidelines

Check List - Prior to Use

1. Heart+ResQ™ is only for the sudden cardiac arrest patients.

Sudden cardiac arrest patients exhibit the following conditions :

- 1) Unconsciousness
- 2) No movement
- 3) No pulse

2. Before using the product, keep in mind the following :

- 1) Electric shocks are conductive to water, so move the patient to another place if the surface is wet and remove any liquids off the skin of the patient prior to use.
- 2) Ensure that the equipment in an operational state, and not sounding error warnings, before attempting use by checking the standby mode LED state.

* If the battery is normal, the electrode pad attachment lamp () blinks every 7 seconds.

3. Take off patient's upper-body clothing and attach electrode pads.

- 1) Electrode pads should be adhered to the patient's body in the same way as illustrated on the picture on the pads themselves and on the AED's main panel.
- 2) If the patient's body is wet and contaminated, you should put electrode pads on the body **after** using the supplied towel to clean and dry the patient. If for some reason there is no towel, use any nearby cloth, such as the patient's top clothing to make sure the patient is clean and dry.

Failure to do so may result in incorrect ECG analysis.

4. While operating the device, pay close attention to the following :

- 1) The **electrode pads should be apart from each other** and/or metallic parts touching the patient.
- 2) While Heart+ResQ™ is analyzing the patient's state, **the patient must not be touched or moved**, because this will result in an incorrect ECG analysis.

- 3) If on a bed or stretcher, avoid contact between patient's exposed skin, such as the neck, arms, legs, etc. with the metallic bed frame or stretcher frame during use.
- 4) First responder must not touch the patient and the equipment at the same time.
- 5) Do not touch the patient during device's preparation of defibrillation or during defibrillation shock administration.

*Failure to heed this warning may result in **unintentional shock to first responder**.

- 6) If any problem is found during operation, turn off the power and see the instructions manual.

5. Heart+ResQ™ is recommended for use by first responders familiar with AED operation and CPR administration.

Heart+ResQ™ is simple and user-friendly, so there is a good chance of successful use by a layman; however, chances of successful resuscitation increases with first responder's familiarity with AED operation and CPR administration.

6. The state of Heart+ResQ™ should be checked periodically.

- 1) Self-diagnostics test on circuitry, which ensures device integrity, is performed every day, and in case that any problem occurs, the state indicator light and warning sounds will alert nearby individuals and administrators. **However, if the device is kept isolated at all times, without a sensor to detect errors and deliver warnings to remote administrators, no one will know the device has an error or the battery is running low.**

7. When replacing a battery pack, take care to not have your fingers pinched during the process of insertion.

8. When a battery pack is damaged, dispose of it properly.

- 1) The battery pack contains disposable lithium-ion battery.
- 2) Contact your local government or recycling center for instructions on proper disposal of lithium-ion batteries.
- 3) When the inner battery is damaged, there is a risk of fire and explosion.

9. Precautions for using electrode pads

- 1) Attach the pads connectors to the pads attachment port by lifting the lock guard and aligning with the same colors (blue to blue, white to white).
- 2) Pads connector should fit easily into the pads attachment port; there is no need to insert by using excessive force.

10. Do not introduce liquids into the main unit or other accessories.

Although the Heart+ResQ™ is produced with high particle and water resistance ratings, it is never a good idea to introduce fluids to the main unit, which increase the chances of failure of the device during operation and/or a danger of explosion.

11. Treat defibrillators like any other electronic devices.

Heart+ResQ™ works normally even when it is placed near other electronic devices which emit electromagnetic or radio frequencies, such as mobile phones or speedometers, due to its high resistance level to electronic frequencies. However, we recommend that you maintain at least a short distance between portable or mobile RF communication device (transmitter) and Heart+ResQ™ in order to eliminate any chance of negative effects to the device during operation.

12. Do not use a battery pack and electrode pads of Heart+ResQ™ trainer (training module) for Heart+ResQ™.

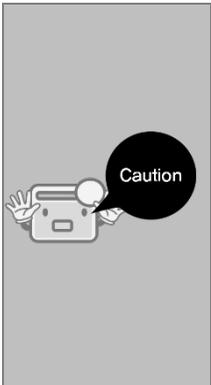
*Only use Heart+ResQ™ battery pack and electrode pads for Heart+ResQ™ that are provided by the manufacturer. **The battery pack and electrode pads of the training module will not work on the actual defibrillator.**

Post-Use Product Management

After the Using the Heart+ResQ™ ...

1. You need to inspect the exterior of the equipment to check damage, dirt or contamination. When you find the damage, contact customer service center to get the support. You need to clean the product according to the cleaning guideline when the product is stained with dirt or is contaminated.

2. Used Electrode pads - After disposing of used electrode pad, check the expiry date of new electrode pads and replace it. The cartridge for our product is a disposable electrode pads. Please refer to installation method of electrode pads specified in Chapter 2 Use of Product for the replacement of the electrode pads.

	<p>Only electrode pads that are supplied by our company should be used for our product.</p> <p>As soon as you open electrode pads, adhesive element of electrode pad starts to dry regardless of expiry date and it cannot be used.</p> <p>*To enable a faster response for next use, keep the pads connected to the AED and the pouch inside the mesh pocket of the carry bag front cover.</p>
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3. Perform self-test referring to self-test method specified in Chapter 2 Use of Product. After finishing self-test, when state light flickers in green color, it means equipment is operated normally. If you have any problem, contact our customer service center.

4. After you keep the product in designated place, you need to be prepared to use it when necessary.

Product Upkeep

You can clean the exterior of the product using moistened soft cloth by soapy water, light chlorine bleach (2 teaspoons per 1 liter water) or cleaner which is made of ammonia.

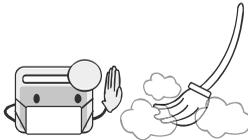
	<ul style="list-style-type: none">• Do not soak the product or accessories in liquid or detergent.• Keep the product from entering of any liquid into it.• Do not use the detergent containing abrasive ingredients.• When product is submerged into the water, contact our customer service center immediately.• Do not sterilize the product or accessories.• Do no place inside dishwasher or autoclave.
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Storage Guidelines

1. Store in a dry place.



	<p>Do not spill water on Heart+ResQ™ while operating. This may result in electrocution or defibrillation shocks may not be delivered to patient's heart.</p>
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2. Store in a place not contaminated by airborne dust and salt.



3. Be careful of shock, vibration, impacts and etc.

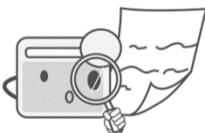
	<p>Dropping or slamming the product on purpose may cause problems.</p>
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4. Do not store where chemicals, gas, or fuel are being stored.



5. If the product has not been used for a long period of time, perform a self-check (Page 58) by pushing the "Status" button.



6. In case a problem occurs with the product, get an immediate equipment inspection by your local distributor.

Cautions for Battery Pack

1. Do not heat battery pack or throw them into fire.

Heating the battery pack more than 100 degrees centigrade could increase the internal pressure and electrolyte may boil causing resin parts to melt, resulting in leakage, explosion or fire.

Also throwing the battery pack into fire can cause combustion of organic solvents in the lithium-ion battery electrolyte, which is very dangerous.

2. Do not attempt to disassemble the battery pack.

If the battery pack is disassembled, it may short-circuit and cause metallic lithium reaction with moisture in the air. The leaking electrolyte may generate heat and catch fire, then the cartridge may emit smoke, burst or ignite.

3. Battery pack storage recommendations.

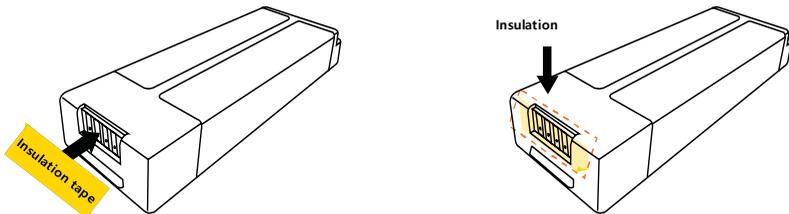
In keeping the battery pack, your attention is required as follows :

- 1) When storing a battery pack out of the pouch, be sure that the terminals of the battery pack is short-circuited.
- 2) Store it in a clean, dry, and cool place away from heat and metal objects (before putting it into the device, or when outside of the device). Avoid exposure to direct sunlight, high temperature or high humidity when storing batteries, because these conditions may result in cartridge degradation and leakage of liquid.
- 3) Do not lick the battery pack or put terminals on your lips.

4. Guidelines for battery pack.

- 1) Device administrators discarding spent battery pack should throw them away as nonflammable waste. However, local jurisdictions might have different disposal rules and methods for spent battery packs.
- 2) Commercial disposal of spent battery packs by contacting a waste disposal company is recommended and may be required by local laws.
- 3) When discarding battery pack, insulate the + and - terminals of batteries with insulation tape as shown below to avoid short-circuiting the battery pack. Otherwise, the battery could generate heat, catch fire, or burst.

Insulation example for discarding cartridges.



	<p>When disposed of improperly, lithium-ion batteries inside the cartridge might short, causing them to become hot, burst or ignite, catch fire and result in injury.</p>
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Glossary of Symbols

Symbols	Definition
	Consult instructions before use
	Caution, consult accompanying documents
	Do not indiscriminately throw cartridge (batteries) away. It's exposure to moisture or external stimulation causing fire or explosion
	Type and Extent of Protection against electric shock
	Caution high voltage
	Compliant to EC Directive 93/42/EEC

Symbols	Definition
	Recommended temperature range
	Fragile, handle with care
	Keep away from rain
	Keep away from sunlight
	<p>Non-rechargeable lithium battery.</p> <p>Do not attempt to charge the battery.</p> <p>This equipment is cannot be used for training or education.</p>
	Manufacturer

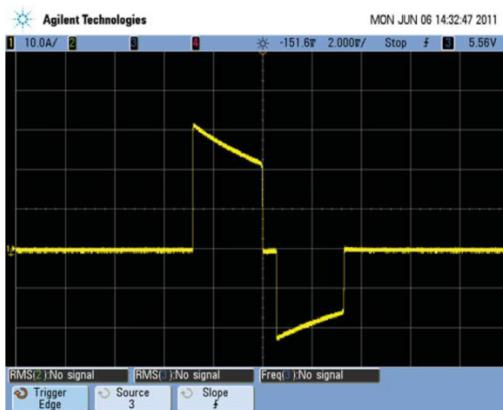
Symbols	Definition
	EU representative
	Date of manufacture
	Serial number
	Power ON/OFF
	Catalog number
	Expiration date (date of expiry)

Section IV

Appendix

Defibrillation Waveform

Electric energy output system: Biphasic



[Fig1] Biphasic electric energy output waveform

[Table1] Adult mode energy discharge time according to the patient impedance

Energy output parameter: Energy output time is automatically and adjusted by the impedance of the patient.

(Error rate \pm 10%)

Impedance (Ω)	Phase 1 duration (ms)	Phase 2 duration (ms)	Output energy (J)
25	2.8	2.7	151
50	4.4	4.4	149
75	6.1	6.1	148
100	7.9	7.9	153
125	9.7	9.7	147
150	11.5	11.5	149
175	13.3	13.3	146

[Table2] Pediatric mode energy discharge time according to the patient impedance

Energy output parameter: Energy output time is automatically and adjusted by the impedance of the patient.

(Error rate \pm 10%)

Impedance (Ω)	Phase 1 duration (ms)	Phase 2 duration (ms)	Output energy (J)
25	2.8	2.7	48
50	4.4	4.4	49
75	6.1	6.1	50.
100	7.9	7.9	49
125	9.7	9.7	49
150	11.5	11.5	48
175	13.3	13.3	47

Characteristic of ECG analysis

ECG analysis accuracy

ECG Rhythm Class		AAMI DF39 requirement ¹	Observed performance Validation results ²	90% one-sided Lower confidence limit ¹
Shockable	VF	Sensitivity>90%	95% (n=200)	87%
	VT	Sensitivity>75%	78% (n=50)	67%
Non-shockable	Normal sinus rhythm	Specificity>99%	100% (n=150)	97%
	Asystole	Specificity>95%	100% (n=100)	92%
	Others	Specificity>95%	96% (n=50)	88%

1. American heart Association (AHA) AED Task Force, Subcommittee on AED Safety & Efficacy. Automatic External Defibrillators for Public Access Us: Recommendations for Specifying and Reporting Arrhythmia Analysis Algorithm Performance, Incorporation of New Waveforms, and Enhancing Safety. Circulation March 18, 1997 vol. 95 no. 6 1677-1682.

2. From MIT-BIH ECG arrhythmia database. (<http://ecg.mit.edu/>)

Electromagnetic Compatibility (EMC)

1) Electromagnetic Emission

Emission Test	Compliance	Electromagnetic environment – Information
RF(Radio Frequency) CISPR11	Group 1 Class B	RF energy is only used for the device's own internal function. Therefore, self-RF emission level is very low; in addition, it will not have effect on the operation of electronic equipment near it. Heart+ResQ™ may be used in residential buildings or general facilities where common low voltage power is connected.

2) Electromagnetic immunity

Immunity test	IEC60601 Test level	Compliance level	Electromagnetic environment guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±15kV contact ±15kV air	There are no special requirements with respect to electrostatic discharge.
Power frequency (50/60Hz) Magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial/hospital environment. There are no special requirements for non-hospital environments.
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.5GHz	20 V/m	Portable and mobile RF communication equipment should be used no closer to any part of the Heart+ResQ™, including cables, than is absolutely necessary.  Interference may occur in the vicinity of equipment marked with the following symbol.

NOTE 1. At 80 MHz and 800 MHz, 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.

a. The ISM (industrial, scientific and medical) bands between 150kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

b. An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150kHz and 80MHz and in the frequency range 80MHz to 2.5GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient area.

c. 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 Heart+ResQ™ is used exceeds the applicable RF compliance level above, the Heart+ResQ™ should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Heart+ResQ™.

3) Recommended separation distances between portable and mobile RF communications equipment and the Heart+ResQ™ defibrillator.

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

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)	
	80MHz ~ 800MHz $d=0.6\sqrt{P}$	80MHz ~ 2.5GHz $d=1.15\sqrt{P}$
0.01	0.06	0.115
0.1	0.19	0.36
1	0.6	1.15
10	1.9	3.64
100	6.0	11.5

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be determined 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 80MHz and 800MHz, the separation distance for the higher frequency range applies.

NOTE 2. The ISM (industrial, scientific and medical) bands between 150 kHz and 80MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957MHz to 27.283MHz; and 40.66MHz to 40.70MHz.

NOTE 3. An additional factor of $10/3$ is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150kHz and 80 MHz and in the frequency range 80MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient area.

NOTE 4. These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Voice Prompts

1. Mode

- a. "AED in Adult Mode. Call for emergency medical assistance"
- b. "AED in Pediatric Mode. Call for emergency medical assistance"

2. Pads attachment

- a. "Peel one pad from its liner and attach it to the patient as shown in the picture on the pad; repeat the process with the other pad"
- b. "Check the pads"

3. ECG analysis

- a. "Don't touch the patient"
- b. "Analyzing ECG ..."

4. Shock advice

- a. "Shock Advised Charging Now"
- b. "Don't touch the patient"

5. Defibrillation shock

- a. "Push the flashing shock button"
- b. "You did not press the shock button."
- c. "Cancel preparation for electric shock"
- d. "Electric shock is done. Commence CPR"

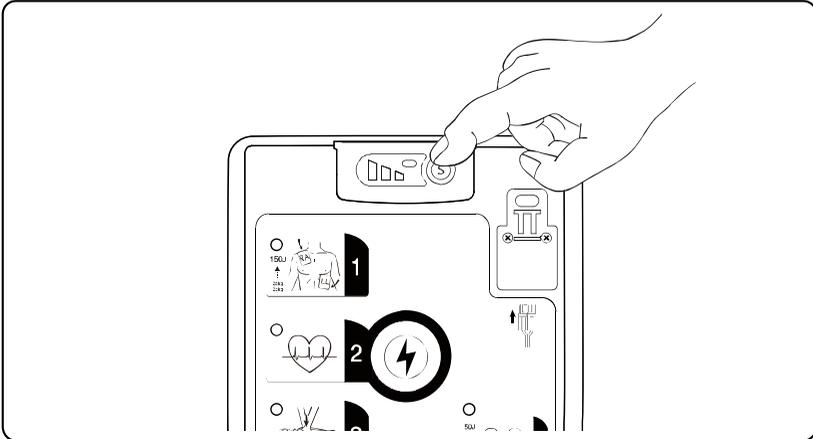
6. CPR

- a. "Use both hands, one overlapping the other, to push down at the center of the chest; keep pace with the metronome"
- b. "Check for breath and consciousness."

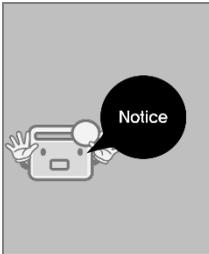
7. Miscellaneous

- a. "AED powering off"
- b. "The battery is low."
- c. "Replace the battery."
- d. "Equipment check is needed."
- e. "Contact customer support."
- f. "PC Connecting Mode."

Diagnostics & Troubleshooting

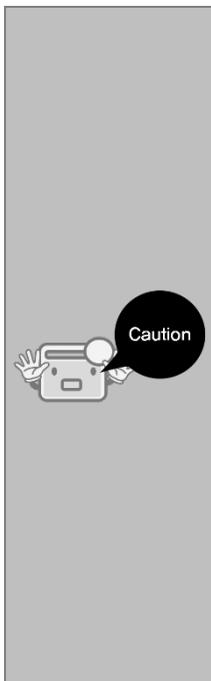


1. Heart+ResQ™ should be off when the S button () is pressed.
2. During equipment check, the lamps start to flash in the following order: the electrode pad attachment lamp, the electrocardiogram lamp, the cardiopulmonary resuscitation lamp. (The number of flashes for each lamp could be different because they have different check times.)
3. If the equipment is in good condition, the power will be automatically off after self-diagnosis.
4. If there is an error (not related to low batteries), all lights will be flashing at the same time continuously until the battery runs out. Also, the following auditory error message will play two (2) times consecutively, repeating every sixty (60) minutes: **“Equipment check is needed.”** Try replacing the battery cartridge to see if error persists. If results are the same, contact your local distributor or NANOOMTECH directly.



- When the remaining battery charge is low, the indicator light is flashing “red” and the flashes stop when the battery is discharged completely.
- Until complete discharge of the battery, voice prompts warn; “The battery is low, change the battery.”

Note: Heart⁺ResQ™ will automatically perform a self-test every day at local time 1500 hours. The automatic self-test time can be changed in the NT-MPR program. The automatic self-test performs the same functions as when done manually and yields the same results (as in the previous page).



- When you approach a machine with the indicator light blinking red, but you are not certain whether it is a low battery issue or an actually equipment error, push the main power button to shut off the AED, then perform the self-test (Step 1 of previous page).
- In the event of an equipment error (not related to low batteries) you will hear **“Equipment check is needed,”** in which case you should immediately contact your local distributor or NANOOMTECH directly (via phone or e-mail listed on the last page of this manual, “Service & Warranty”). **Do not attempt to fix the device on your own as this will void your 5-Year Manufacturer Warranty.**

Service & Warranty

Paid repair / service charge may apply in the case where...

- damage is caused by natural disaster (fire, damage from sea water, gas, earthquake, damage from storm and flood, and etc.) or an act of God.
- damage is caused by abnormal use electric power through manipulation of connectors.
- damage is caused by unauthorized repair or alteration made by people than technicians from our service center.
- damage is a result of other external causes, which are not the defects of the product itself.
- equipment or accessories must be replaced or repaired due to wear and tear from normal use.

Warranty Registration

- NANOOMTECH CO., LTD guarantees this product for a period of five (5) years.
- If customer service or dealer is unknown, contact manufacturer directly at the following numbers: (070) 4265-1452, (070) 4265-1453 or (070) 4265-1455.

Note: For warranty protection guarantee, you MUST complete the following form and submit it to your dealer or by visiting <http://nanoomtech.co.kr/eng> (Support > Warranty) with a copy of your purchase receipt.

Warranty registration must be completed within 90 days of purchase

Cut here ✂-----

Customer Name			
Address			
City, Country		Zip Code	
Phone		Purchase Date	
E-mail		Serial Number	
Product		Brand Name (Model)	Heart+ ResQ™ (NT-381 /NT-381.C)