Defibtech RMU-2000 Automated Chest Compression System

User Manual

ELECTRONIC DISTRIBUTION

RAC-A2510EN-DC rev B

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Patents

For patent information, see www.defibtech.com/patents.

CAUTION

Federal Law (USA) restricts this device to sale by or on the order of a physician.

Contents

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1 Introduction to the RMU-2000 ACC

This User Manual provides information to guide trained operators in the use and maintenance of the Defibtech RMU-2000 Automated Chest Compressor (ACC) and its accessories.

This chapter includes an overview of the RMU-2000 ACC, intended use information, a discussion of when it should and should not be used, and information on operator training.

1.1 Overview

The RMU-2000 ACC is an automated, portable, battery-powered device that provides chest compressions on adult patients who have cardiac arrest. The RMU-2000 ACC can be used in a wide variety of situations and settings: on the scene, during patient movement, and during transportation in road ambulances.

The RMU-2000 ACC, when applied to a patient who is unconscious and not breathing, is designed to:

- Provide consistent depth and rate chest compressions.
- Allow for automated chest compressions in both the in-hospital and out-of-hospital settings including during patient transport.
- Be applied to the patient with minimal interruption of CPR.

The major components of the RMU-2000 ACC are the Backboard, the Frame and the Compression Module. The Backboard is placed under the patient to provide a base for the RMU-2000 ACC system. After a single-use Suction Cup is installed onto the Frame, the Compression Module is then mounted into the Frame, causing the Suction Cup to attach to the Compression Module's piston. The Compression Module and Frame assembly is then placed over the patient and snaps into the Backboard with self-locking latches. The Compression Module contains the user control panel, a replaceable Battery Pack, and the piston and is used to generate the chest compressions.

The RMU-2000 ACC can be operated using a replaceable, rechargeable Battery Pack. It can also be operated, with a Battery Pack installed in the Compression Module, using an external power adapter. A fully-charged, new Battery Pack can provide continuous operation for over an hour and can be recharged in the Compression Module.

Once the RMU-2000 ACC has been powered on and applied to the patient, compressions are initiated by adjusting the piston to the patient's chest and pressing either of the Run Compressions buttons. Additional user interface features include a pause function, a warning indicator to notify the operator for possible misuse or malfunction, and a Battery Pack capacity gauge.

A Bluetooth® technology ON/OFF button on the user control panel allows for RMU-2000 ACC data retrieval and event reporting when used in conjunction with utility software available at www.defibtech.com via a wireless connection between the Compression Module and a personal computer. A USB port on the underside of the Compression Module also allows connection to a personal computer for data retrieval when a wired connection is preferred or when a Bluetooth® connectivity is not possible or desired.

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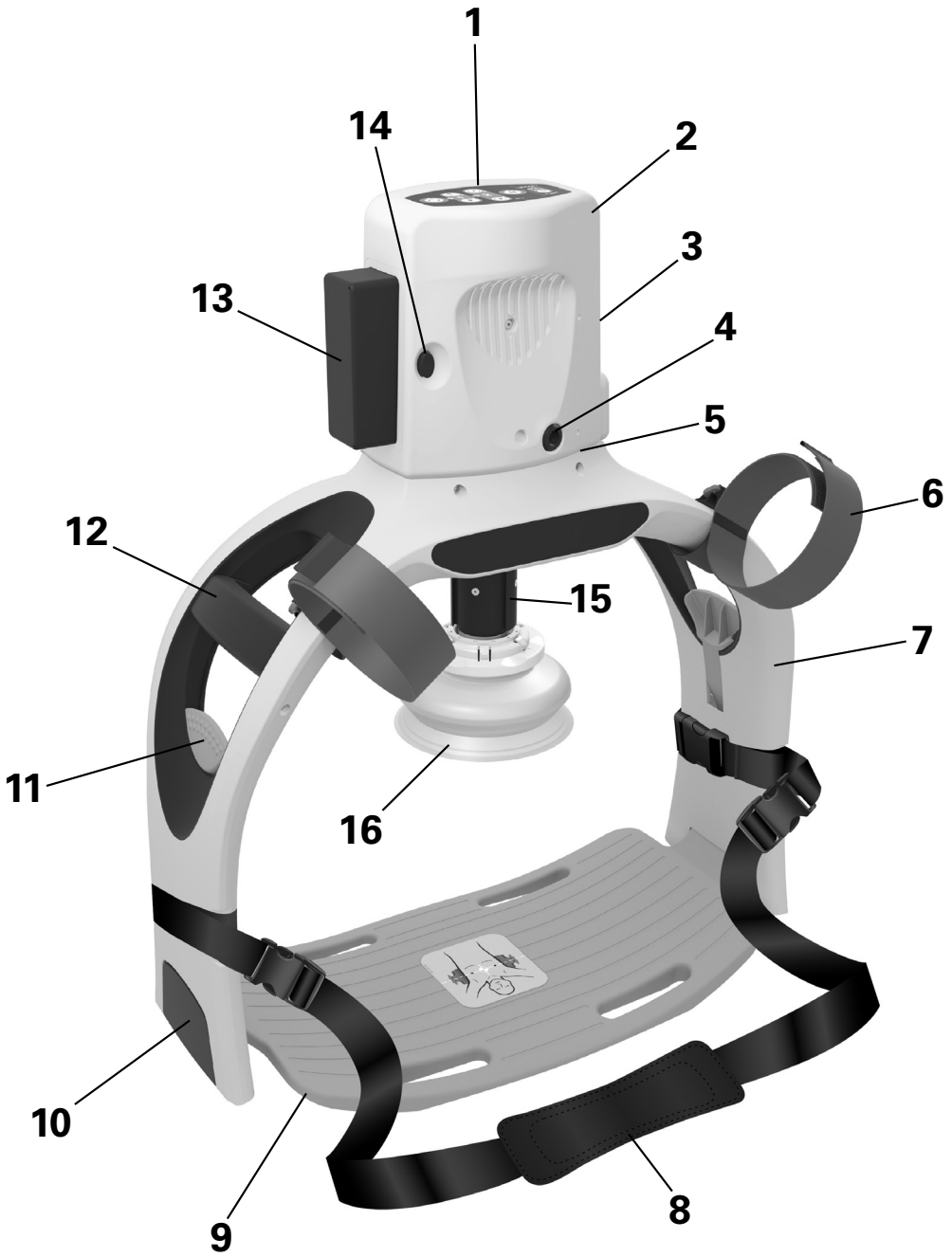
1.2 The Defibtech RMU-2000 ACC



1. **User Control Panel.** The User Control Panel contains the user interface for the RMU-2000 ACC system.
2. **Compression Module.** The Compression Module contains all the therapeutic components of the RMU-2000 ACC system, including the piston drive mechanism, the control electronics, the User Control Panel, and the Battery Pack interface.
3. **Serial Number.** The serial number can be found on the Compression Module.
4. **External Power Input.** The External Power Input jack is used to connect an external power adapter to operate the unit (with a Battery Pack installed) or to charge the Battery Pack.
5. **USB Port.** The USB Port is located on the bottom of the Compression Module. It allows the Module to be directly connected to a personal computer and for RMU-2000 ACC data retrieval and event reporting when used in conjunction with utility software available at www.defibtech.com. It is not intended to be used during rescue operation.
   Note: A Bluetooth® ON/OFF button on the User Control Panel (item 1) allows for wireless connection between the Module and the PC.
6. **Patient Wrist Straps.** The Patient Wrist Straps are used to attach a patient's arms to the RMU-2000 ACC for ease of transporting the patient and the RMU-2000 ACC. To maximize the available time to perform a rescue, Defibtech recommends that the Patient Wrist Straps be affixed to the Frame (item 7) **prior** to a rescue.
7. **Frame.** The Frame attaches to the Backboard and holds the Compression Module. It is used to maintain the Compression Module's position over the patient.
8. **Stabilization Strap.** The Stabilization Strap is used to stabilize the RMU-2000 ACC while compressions are being applied by the unit to the patient. To maximize the available time to perform a rescue, Defibtech recommends that the Stabilization Strap's Frame Straps be affixed to the Frame **prior** to a rescue.
9. **Backboard.** The Backboard is the base for the RMU-2000 ACC system. It is placed under the patient and provides an interface that the Frame attaches to.
10. **Backboard Latches.** One on each side of the Frame, the Backboard Latch is the mechanism that secures the Frame to the Backboard.
11. **Backboard Release Levers.** One on each side of the Frame, the Backboard Release Levers are used to release the Frame from the Backboard.
12. **Handles.** One on each side of the Frame, the Handles provide a secure way to grasp the Frame during RMU-2000 ACC assembly and patient transport.
13. **Battery Pack.** The Battery Pack provides a replaceable primary power source for the Compression Module.
14. **Battery Pack Release Buttons.** The Battery Pack Release Buttons (one on each side of the battery compartment on the Compression Module) eject the Battery Pack from the Compression Module.
15. **Compression Piston.** The Compression Piston is driven by a motor housed inside the Compression Module and, with the Suction Cup attached to the end of the Piston, provides the compressions to the patient's chest.
16. **Suction Cup.** The Suction Cup is a user-replaceable, single-use component that provides the interface between the piston and the patient's chest.

1.3 Indications for Use / Intended Use

The RMU-2000 Automated Chest Compression System (ACC) is to be used for performing external cardiac compressions on adult patients who have acute circulatory arrest defined as absence of spontaneous breathing and pulse, and loss of consciousness.

The RMU-2000 ACC must only be used in cases where chest compressions are likely to help the patient.

The RMU-2000 ACC is intended for use as an adjunct to manual cardiopulmonary resuscitation (CPR) on adult patients when effective manual CPR is not possible (e.g., during patient transport, or extended CPR when fatigue may prohibit the delivery of effective/consistent compressions to the victim, or when insufficient personnel are available to provide effective CPR).

1.4 Contraindications

Do not use the RMU-2000 ACC in the following cases:

- It is not possible to position the RMU-2000 ACC safely or correctly on the patient's chest
- The patient is too small for the starting piston height to reach the patient's chest
- The patient is too large for the Frame to attach to the Backboard or if the Compression Module/Piston cannot be mounted without compressing the patient's chest

Always follow local and/or recognized resuscitation guidelines for CPR when using the RMU-2000 ACC.

1.5 Side Effects

The International Liaison Committee on Resuscitation (ILCOR) states the following side effects of CPR:

"Rib fractures and other injuries are common but acceptable consequences of CPR given the alternative of death from cardiac arrest. After resuscitation, all patients should be reassessed and re-evaluated for resuscitation-related injuries." *(From the 2005 International Consensus Conference on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations, hosted by the American Heart Association in Dallas, Texas, January 23–30, 2005. Published in Circulation. 2005; 112: III-5-III-16.)*

The above side effects, as well as bruising and soreness of the chest, may commonly occur after the use of the RMU-2000 ACC. *(Black CJ, Busuttil A, Robertson C. Chest wall injuries following cardiopulmonary resuscitation. Resuscitation. 2004 Dec;63(3):339-43.)*

1.6 Operator Training Requirements

In order to safely and effectively operate the RMU-2000 ACC, it is the responsibility of the operator to obtain the following training:

- RMU-2000 ACC training in accordance with the User Manual including handling of the actual device
- CPR training in accordance with resuscitation guidelines as required by local, state, provincial, and/or national regulations, e.g. American Heart Association, European Council of Resuscitation
- Thorough knowledge and understanding of the material presented in this User Manual

The RMU-2000 ACC is intended for use by qualified medical personnel certified to administer CPR (e.g. first responders, ambulance personnel, nurses, physicians or medical staff).

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2 Warnings and Cautions

This chapter includes a list of warnings and cautions that relate to the RMU-2000 ACC and its accessories. Many of these messages are repeated elsewhere in this User Manual and on the RMU-2000 ACC or accessories.

2.1 WARNING WARNINGS:

Immediate hazards that will result in serious personal injury or death.

None known.

Conditions, hazards, or unsafe practices that may result in serious personal injury or death.

- Improper use can cause injury to patient. Use the RMU-2000 ACC only as instructed in the User Manual.
- Improper use can cause injury to operator or bystander. Keep fingers and hands away from Piston and Suction Cup during operation.
- Improper maintenance can cause the RMU-2000 ACC not to function. Maintain the RMU-2000 ACC and rechargeable Battery Pack only as described in the User Manual. Failure to maintain the Battery Pack per the instructions outlined in this User Manual may result in the RMU-2000 ACC becoming inoperable.
- No modification of this equipment is allowed. The RMU-2000 ACC contains no user-serviceable parts.
- Do not immerse Compression Module or Battery Pack in water or other liquids. Immersion in fluids may result in fire or explosion.
- The RMU-2000 ACC is not intended to be sterilized and only approved cleaning agents should be used.
- Do not let fluids get into the Compression Module. Avoid spilling fluids on the RMU-2000 ACC or its accessories. Spilling fluids into the RMU-2000 ACC may damage it or cause a fire or shock hazard.
- If the patient is too large for the Frame, remove Frame and continue manual CPR compressions.
- Do not use the RMU-2000 ACC if the Frame cannot be latched in place (for any reason).
- Keep clothing and other objects from interfering with the Frame latching mechanism when connecting to the Backboard.
- Do not initiate automated chest compressions if a Suction Cup is not attached to the end of the Piston as doing so may result in patient injury. If a Suction Cup is not available, discontinue use of the RMU-2000 ACC and continue performing manual chest compressions.
- If the Piston cannot be adjusted so that the Suction Cup reaches the patient's chest or if the load pressure upon reaching the chest is insufficient for the RMU-2000 ACC to deliver compressions, the patient is too small. Remove Frame and continue with manual CPR compressions.

WARNINGS (continued)

- Do not initiate automated chest compressions if the Piston is not in the proper position. An incorrect start position may compromise the patient's blood circulation.
- Incorrect position over chest can result in injury or lack of effectiveness.
- Incorrect Piston start height can result in injury or lack of effectiveness.
- Carefully monitor the position of the Piston on the patient's chest to ensure that it has not moved from the appropriate target area. Pause compressions and readjust position if needed.
- Changed position over the chest during operation can result in injury or lack of effectiveness.
- Do not leave the RMU-2000 ACC running while unattended. Patient injury may result if the unit is left unattended.
- Continuously monitor the patient's vital signs and overall physiology while the RMU-2000 ACC is delivering chest compressions.
- The RMU-2000 ACC can become hot during extended use. The applied part of the piston may rise 5°C above ambient.
- If the position of the Piston changes as a result of defibrillation or other therapies, immediately stop compressions and re-adjust the position of the RMU-2000 ACC.
- Mechanical chest compressions may cause artifact and interfere with ECG analysis. It may be necessary to pause compressions before performing ECG analysis with other equipment.
- When the Battery Pack indicator shows one red segment, this is a high-priority alarm. Replace the Battery Pack as soon as possible with a sufficiently-charged Battery Pack or apply external power.
- If a spare Battery Pack or external power source are not available and the RMU-2000 ACC stops compressions, remove the unit from the patient and begin manual compressions immediately.
- If there is a malfunction, the compressions are not sufficient, or something unusual occurs during operation (e.g. Suction Cup disconnects from Piston during compressions), then push the Power ON/OFF Button for one second to stop the RMU-2000 ACC from delivering compressions and remove the unit from the patient. Start manual chest compressions as soon as possible.
- If there is a malfunction and the unit will not turn OFF, remove the Battery Pack to stop compressions. Remove the unit from the patient. Start manual chest compressions as soon as possible.
- The Patient Wrist Straps are designed only for use with Defibtech Automated Chest Compression Systems. Do not apply to other items such as a stretcher or bedside rails.
- Do not use the Patient Wrist Straps if damaged, soiled, or if Velcro does not bond sufficiently to securely fasten the patient's wrists to the RMU-2000 ACC.
- Do not over-tighten the Patient Wrist Straps to prevent potential injury. If the Patient Wrist Straps are too loose, they may not securely fasten the patient's arms to the RMU-2000 ACC appropriately.
- Do not use the Patient Wrist Straps to lift the patient. The straps are intended to attach the patient's arms to the RMU-2000 ACC during transport.

WARNINGS (continued)

- Observe the patient's arms during use of the Patient Wrist Straps. Do not leave a patient unattended when using the RMU-2000 ACC or its accessories (e.g. Patient Wrist Straps).
- Do not obstruct intravenous (IV) access when deploying the RMU-2000 ACC or when attaching the Patient Wrist Straps.
- Use of damaged equipment or accessories may cause the device to perform improperly and/or result in injury to the patient or operator.
- RMU-2000 ACC system components must be cleaned and the Suction Cup replaced between patients to avoid cross-contamination. See Section 5.2 for further cleaning instructions.
- The use of accessories other than those specified may result in increased electromagnetic emissions or decreased immunity of the RMU-2000 ACC.
- Do not use the USB cable during emergency use as it interferes with patient care.
- Portable and mobile RF communications equipment should be used no closer to any part of the RMU-2000 ACC, including cables, than necessary.
- The RMU-2000 ACC should not be used adjacent to other electrical equipment. If the situation requires that the RMU-2000 ACC be used when adjacent with other electrical equipment, the RMU-2000 ACC should be observed to verify normal operation in the configuration in which it will be used.
- Do not use in the presence of flammable gases or anesthetics. Use care when operating this device close to oxygen sources (such as bag-valve-mask devices or ventilator tubing). Turn off gas source or move away from patient, if necessary.
- Do not position the RMU-2000 ACC in a way that would cause difficulty to the operator to disconnect it from the power source.

2.2  CAUTIONS:

Conditions, hazards, or unsafe practices that may result in minor personal injury, damage to the RMU-2000 ACC, or loss of data.

- Defibrillation electrodes and pads should not be in contact with and must be clear of the Piston, Suction Cup, and other RMU-2000 ACC components.
- Avoid gel on chest. Gel on the chest (e.g. from defibrillation pads or ultrasound) in the Suction Cup target area may result in movement of the piston. Be sure to remove any gel before use.
- Defibrillation pads or electrodes must be removed or moved away from the Suction Cup target area.
- Do not use on open wounds or if visible signs of existing injuries.
- The RMU-2000 ACC should be applied to the patient's bare chest. Remove clothing, undergarments and jewelry before use.
- The Compression Module must be assembled and locked into the Frame for proper operation.
- The Frame must be latched to the Backboard for proper operation.
- A new battery is set to ship mode. Must be activated before use! Activate battery by charging in unit or charger. See Section 3.11 (*"Charging the Battery Pack"*) for more information.

CAUTIONS (continued)

- Follow all Battery Pack labeling instructions. Do not use a Battery Pack after its expiration date.
- Only use Defibtech-approved accessories with the RMU-2000 ACC. The Battery Pack, Battery Charger, and external power adapter are specifically designed for use with the RMU-2000 ACC. Using other accessories can cause permanent damage and void the warranty.
- The RMU-2000 ACC must be paused in order to replace a Battery Pack. Failure to do so will require the user to power up the RMU-2000 ACC and reset the start position in order to resume compressions.
- The Battery Pack must always be installed to operate the RMU-2000 ACC from external power. Without the Battery Pack, the RMU-2000 ACC will flash the warning indicator and will not perform compressions.
- The mains power quality must be that of a typical commercial or hospital environment or transportation vehicle.
- Make sure other equipment and/or drugs are applicable for use with the RMU-2000 ACC. Consult the equipment's operating instructions.
- If the RMU-2000 ACC becomes hot, prolonged contact with the patient's skin could result in skin burns. If necessary, remove the patient's arms from the Patient Wrist Straps.
- Do not allow the use of Stabilization Strap to delay or prevent other treatment of the patient. Apply strap as soon as possible after beginning compressions and always before patient movement.
- Recycle or dispose of lithium-ion batteries in accordance with local, state, provincial, and/or national regulations. To avoid fire and explosion hazard, do not burn or incinerate the Battery Pack. Do not crush.
- Use and store the RMU-2000 ACC only within the range of environmental conditions specified in the technical specifications.
- The RMU-2000 ACC should not be used in aircraft environments.
- Always store the RMU-2000 ACC so it is ready for use. Store the Compression Module with a fully-charged Battery Pack installed and a Suction Cup attached to the Frame. It is recommended to maintain a charged spare Battery Pack and have the external power adapter available with the unit at all times.
- Although the RMU-2000 ACC is designed for a wide variety of field use conditions, rough handling beyond specifications may result in damage to the unit.
- Federal Law (USA) restricts this device to sale by or on the order of a physician.

3 Setting Up the RMU-2000 ACC

This chapter describes the steps required to make your Defibtech RMU-2000 ACC operational. The RMU-2000 ACC is designed to be stored in a Carrying Case with a small number of easy to assemble components or stored in a fully assembled "ready" state. This chapter explains how to set up the RMU-2000 ACC device.

3.1 Overview

The following components and accessories are included with the RMU-2000 ACC. Replacement and other accessories are detailed in the "*RMU-2000 ACC Accessories*" section. Before getting started, identify each component and ensure that the package is complete.

Backboard

Battery Pack

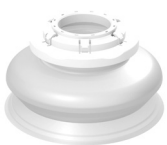
Frame

Compression Module

Carrying Case

AC Adapter and USB Cable *(USB-A to Mini-B; not shown)*

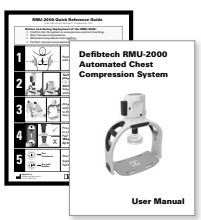
Suction Cup *(quantity 3)*



Stabilization Strap

Patient Wrist Straps

User Manual and Quick Reference Guide

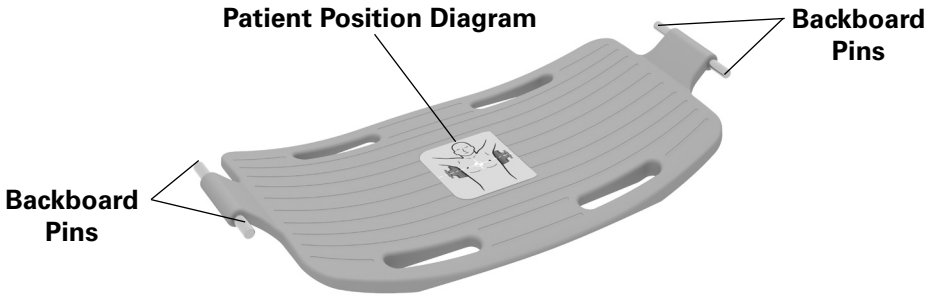


3.2 Complete Initial Assembly of the RMU-2000 ACC

Before being placed into service, the RMU-2000 ACC unit should be completely assembled and operationally checked to ensure that all components are present and functional, per the procedure detailed in Section 3.12, *"Assembling and Testing the RMU-2000 ACC."* Sections 3.3 through 3.11 describe the components of the RMU-2000 ACC system and their basic functionality.

3.3 The Backboard

The Backboard is the base for the RMU-2000 ACC system. It is placed under the patient and has pins that serve as attachment points to which the Frame latches. There are no moving parts on the Backboard.

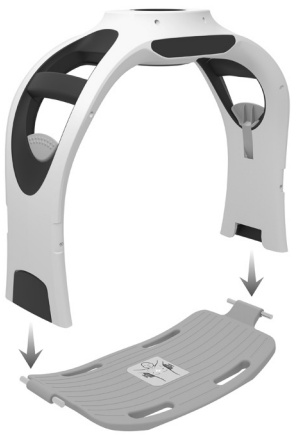


3.4 The Frame

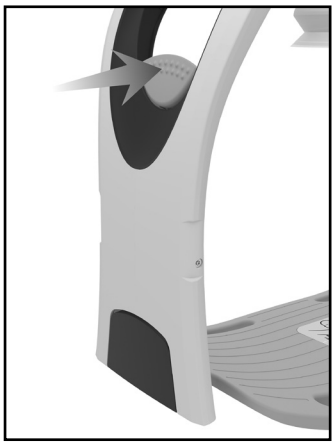
The Frame holds the Compression Module. It attaches to the Backboard and is used to maintain the Compression Module's position over the patient.

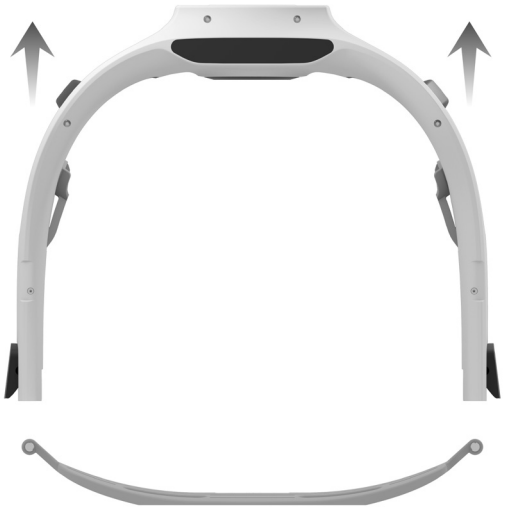
To attach the Frame to the Backboard:

- Place the Backboard on a flat surface, such that the patient position diagram is visible.
- Attach the Frame to the Backboard by aligning the Frame latches over the Backboard Pins and pushing down until the latches click into place. The latches may be clicked into place one at a time or simultaneously.



To remove the Frame, push in on the two backboard release levers and lift the Frame off of the Backboard. The latches may be released together or one at a time.



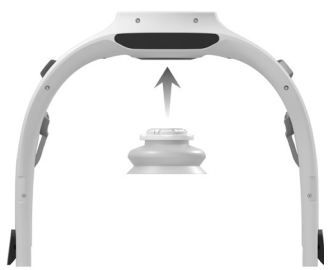


3.5 Installing the Suction Cup onto the Frame

Attach the Suction Cup to the Frame by aligning the circular connector ring on the top of the Suction Cup to the hole on the underside of the Frame's apex and pressing up until the Suction Cup snaps into place, as shown below.

Note: Defibtech recommends that the Suction Cup be installed to onto the Frame **prior** to a rescue and that the Frame be stored in the Carrying Case with the Suction Cup already attached to the Frame.

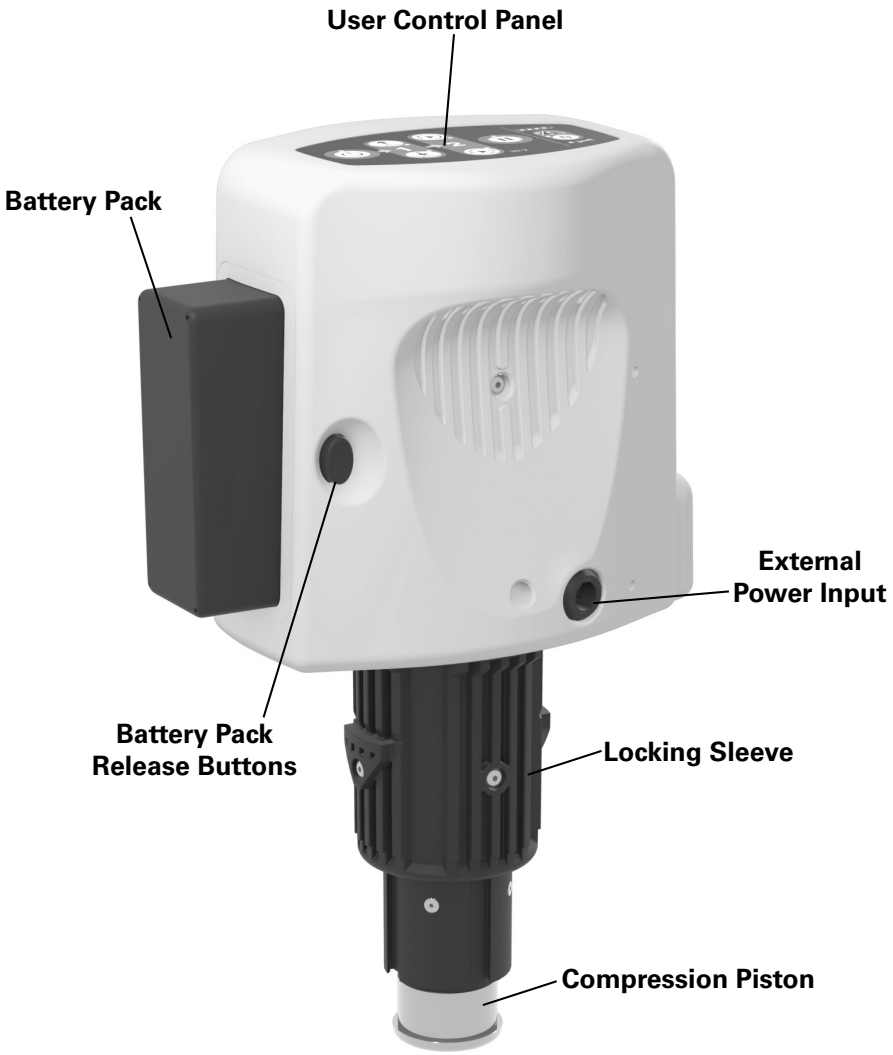
Note: Prior to installation, check to make sure that the Suction Cup is clean and is undamaged. If the Suction Cup is damaged, discard it and install an undamaged one.



Note: The Suction Cup is intended as a single-use item. After being used on a patient, dispose of the used Suction Cup and replace it with a new one.

3.6 The Compression Module

The Compression Module contains all the active components of the RMU-2000 ACC system, including the User Control Panel, the Battery Pack and the Compression Piston. It easily attaches to the Frame and locks into place for operation.

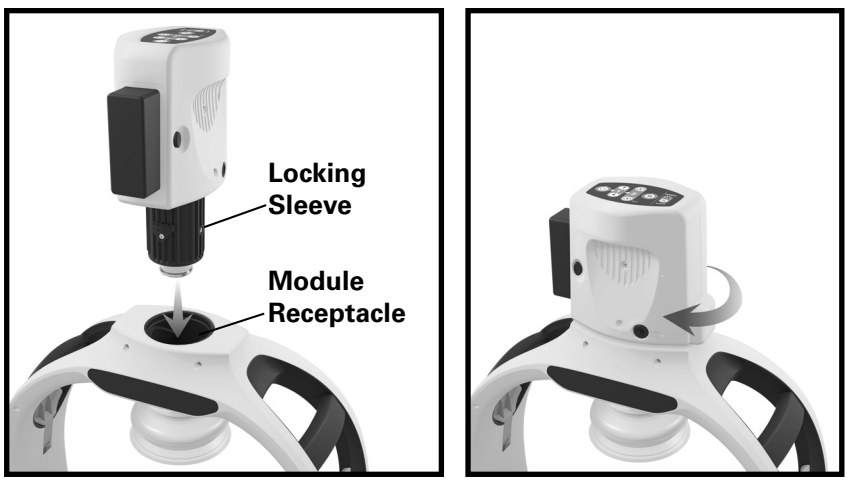


3.7 Installing and Removing the Compression Module and Suction Cup

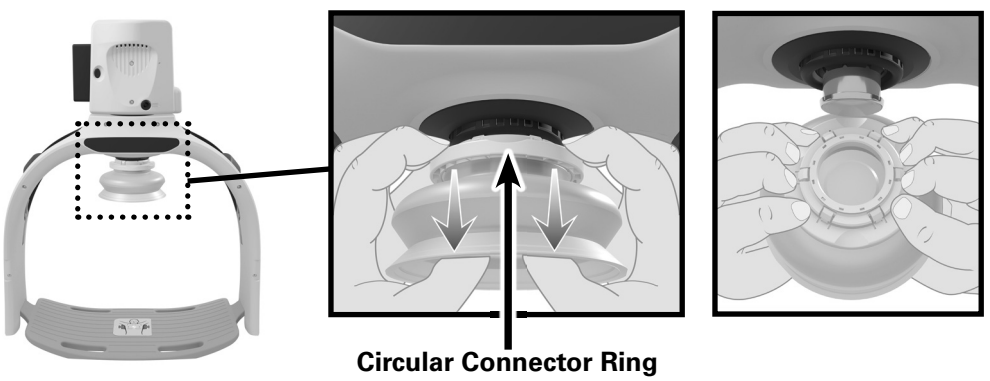
To attach the Compression Module to the Frame, power the Compression Module on and insert it into the module receptacle of the Frame, as shown below. The Module should be inserted at approximately 90 degrees to the Frame at which point it should rest in the Frame.

As the Module is placed onto the Frame, the end of the Piston will push into a connector on the Suction Cup and lock it into place. At the same time that the Piston is locking onto the Suction Cup, the Suction Cup will disconnect from the Frame. Rotate the Module in either direction until it is in line with the Frame and snaps to lock into place.

When properly attached, the Compression Module should be securely attached to the Frame and the Suction Cup should be fully connected to the end of the Piston.

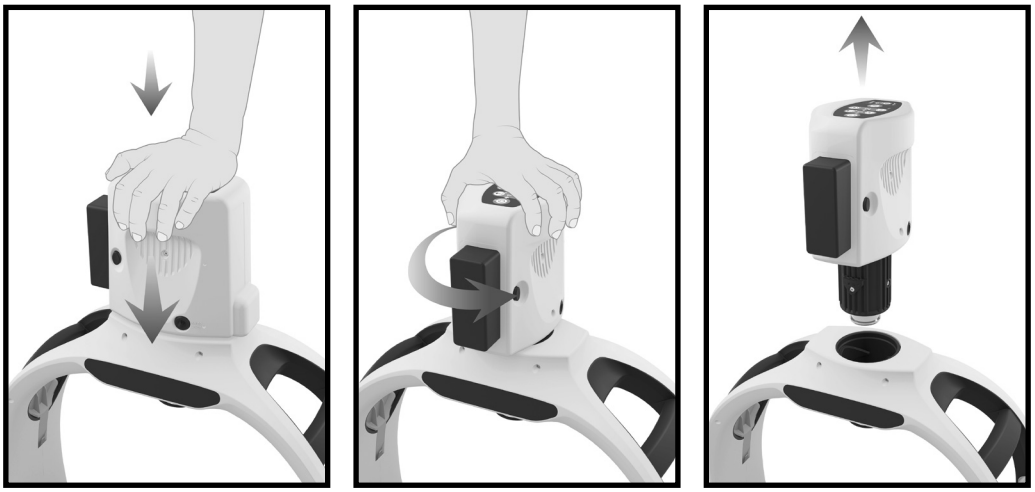


To remove the Compression Module from the Frame, the Suction Cup must first be removed from the Compression Module by grabbing the edges of the Suction Cup's circular connector ring and pulling down firmly, as shown below. ***Note:*** The Suction Cup cannot be removed from the Frame without the Compression Module installed into the Frame.

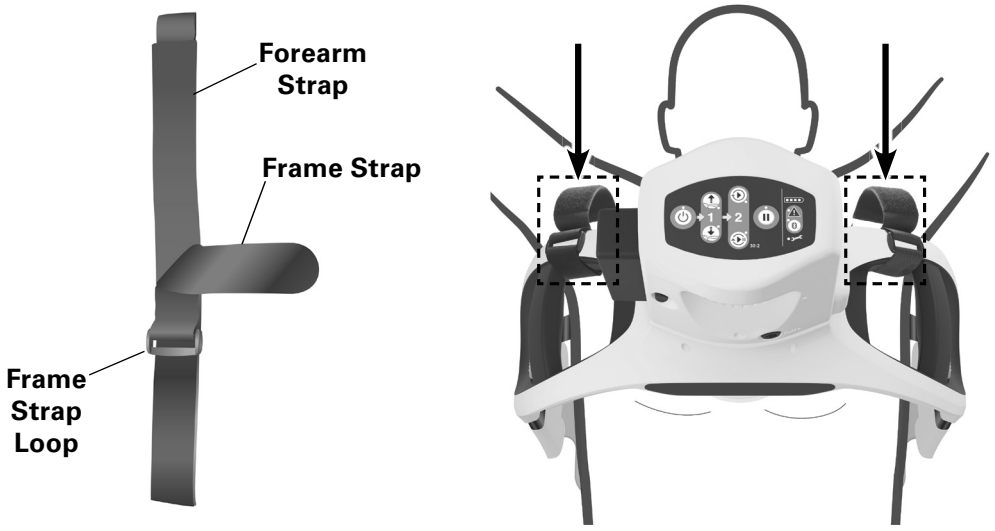


Installing and Removing the Compression Module and Suction Cup (continued)

To remove the Compression Module from the Frame after removal of the Suction Cup, push down on the Compression Module and then rotate it approximately 90 degrees to either direction, as shown below. The Compression Module can then be lifted out of the Frame. Be careful not to drop the Module once removed.



3.8 Attaching the Patient Wrist Straps to the Frame

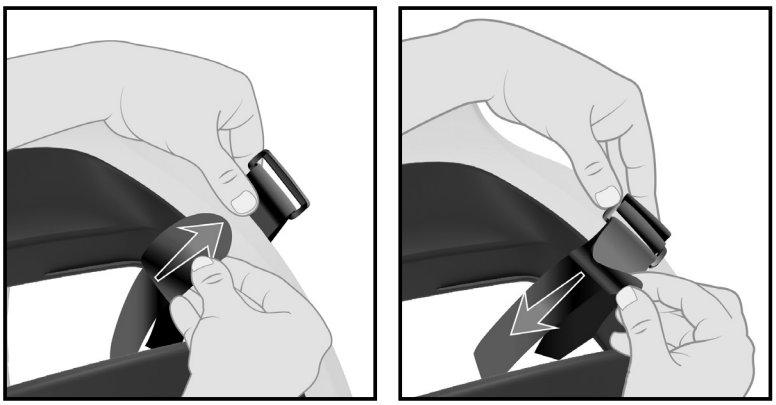


The Patient Wrist Straps are designed to attach a patient's arms to the RMU-2000 ACC for ease of transporting the patient and the RMU-2000 ACC. As shown in the above left illustration, each Patient Wrist Strap is comprised of two main strap sections: a Frame Strap that attaches to the Frame and a Forearm Strap that wraps around the patient's wrist.

Note: As shown in the above right illustration, when attaching the Frame to the Backboard, the Patient Wrist Straps can be oriented towards the patient's head to maintain access to the Frame's Backboard Release Levers or on the opposite side of the Frame as appropriate.

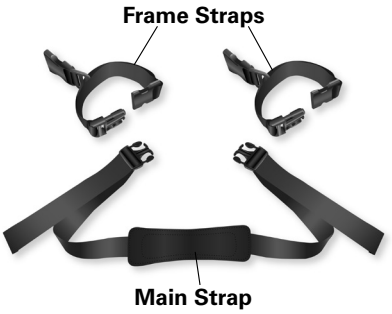
Attaching the Patient Wrist Straps to the Frame (continued)

To maximize the available time to perform a rescue, Defibtech recommends that the Patient Wrist Straps be affixed to the Frame using the instructions shown below **prior** to a rescue and that the Frame be stored in the Carrying Case with the Patient Wrist Straps already attached to the Frame.



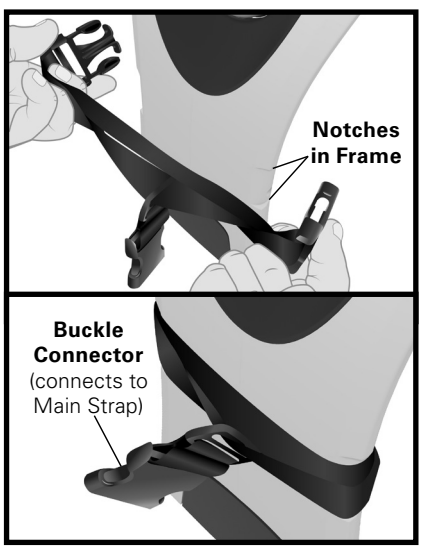
1. Attach the Frame Strap to the Frame by inserting the rounded end of the Frame Strap through the Frame Strap Loop, as shown in the above left illustration.
2. After the Frame Strap has been inserted through the Frame Strap Loop, pull the end of the Frame Strap in the opposite direction so that the Frame Strap is tightly wrapped around the Frame, as shown in the above right illustration. Secure in place using the Velcro® on the underside of the Frame Strap.
3. If necessary, rotate the attached Patient Wrist Strap so that the Forearm Strap component faces up. This allows the procedure described in Section 4.5 to be performed.
4. Repeat the above three steps to attach the second Frame Strap to the Frame.

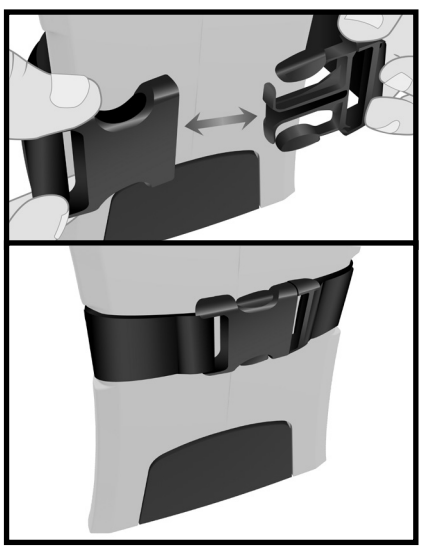
3.9 Attaching the Stabilization Strap Frame Straps to the Frame



The Stabilization Strap helps to ensure that the RMU-2000 ACC remains appropriately positioned when automated compressions are initiated. As shown above, it is comprised of three component parts: a Main Strap that gets situated on the underside of the patient's neck during a rescue and two Frame Straps that attach to the RMU-2000 ACC's frame. Buckle connectors allow for easy attachment of the Frame Straps to the Frame (procedure described below) and of the Main Strap to the Frame Straps (see Section 4.4, "*Stabilization")*.

IMPORTANT: To maximize the available time to perform a rescue, Defibtech recommends that the Stabilization Strap's Frame Straps be attached to the Frame using the instructions below **prior** to a rescue and that the Frame be stored in the Carrying Case with the Frame Straps already attached to the Frame. The Main Strap should also be stored in a compartment within the Carrying Case (see diagrams in Section 3.13, *"Disassembling and Storing the RMU-2000 ACC"*).





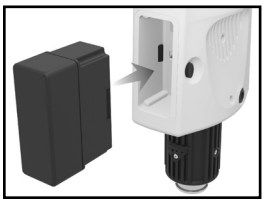
1. Place the Frame Strap on the Frame so that the Frame Strap's inner strap is situated between the two notches in the lower section of the Frame. Make sure that the buckle connector attached to the Frame Strap's outer strap is on the outside of the Frame (i.e. not on the inner surface of the Frame that will be closest to the patient), as shown above in the left-most illustration sequence.
2. Secure the Frame Strap tightly to the Frame by connecting the snap-lock connector clips, as shown above in the left-most illustration sequence
3. Repeat the above steps to attach the second Frame Strap to the Frame.

3.10 Installing and Removing the Battery Pack

The Battery Pack provides power to the RMU-2000 ACC.

CAUTION

Follow all Battery Pack labeling instructions. Do not use a Battery Pack after its expiration date.



Before inserting the Battery Pack into the RMU-2000 ACC, ensure that the Battery Pack opening in the side of the Compression Module is clean and clear of any foreign objects. Insert the Battery Pack into the opening on the side of the Compression Module. Push the Battery Pack all the way in until the latch clicks. The Battery Pack will operate in either orientation (with the contacts toward the unit).

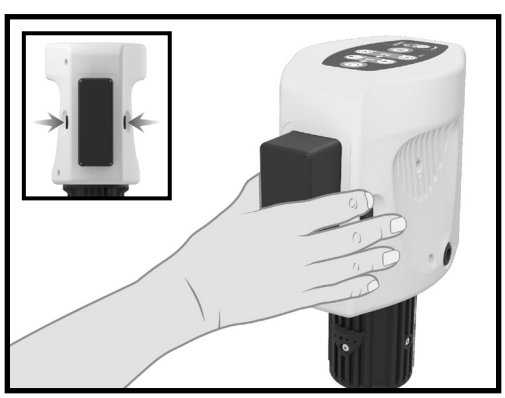
When the Battery Pack is inserted, the RMU-2000 ACC will display the status of the Battery Pack on the Compression Module's Battery Pack indicator for approximately three seconds.

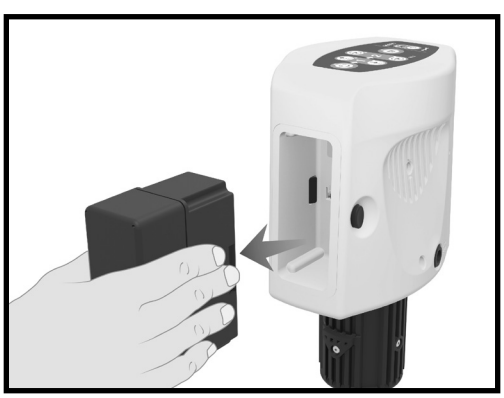
Ship Mode: Battery Packs are shipped from the factory at less than 30% charge capacity in a low-power state known as ship mode to minimize energy loss and ensure safety during shipment. Any Battery Pack in ship mode cannot power the RMU-2000 ACC until it is taken out of ship mode and should be transferred from ship mode to active mode as soon as possible upon receipt. To transfer a Battery Pack from ship mode to active mode, insert the Battery Pack into the Compression Module as described earlier in this section. Then connect the AC Adapter to the Compression Module, as described in Section 3.11, *"Charging the Battery Pack."* Upon detecting external power (allow at least 10 seconds for this to occur), the Battery Pack will automatically switch from ship mode to active mode. The optional Battery Pack Charging Station (see Section 6.7) can also be used to switch Battery Packs from ship mode to active mode. Defibtech recommends charging any Battery Pack that has been brought out of ship mode to full capacity (see Section 3.11 for details). In addition, a Battery Pack should not be stored in ship mode for any longer than 12 months before charging it to full capacity.

CAUTION

A new battery is set to ship mode. Must be activated before use! Activate battery by charging in unit or charger.

To remove the Battery Pack, squeeze the two Battery Pack Release Buttons on both sides of the Battery Pack opening, as shown below at left. After the Battery Pack is partially ejected, pull the Battery Pack out.



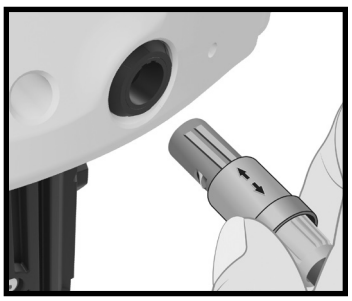


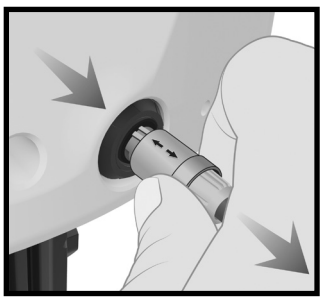
CAUTION

The Battery Pack must always be installed to operate the RMU-2000 ACC from external power. Without the Battery Pack, the RMU-2000 ACC will flash the warning indicator and will not perform compressions.

3.11 Charging the Battery Pack

The RMU-2000 ACC's battery is a proprietary rechargeable Battery Pack. Make sure to fully charge a Battery Pack as part of preparing the RMU-2000 ACC for operation. To charge the Battery Pack, install it into the Compression Module and connect the AC Adapter to the external power input jack on the Compression Module. The Battery Pack can also be charged using an optional Battery Pack Charging Station (see Section 6.7 for details).





To connect the AC Adapter to the RMU-2000 ACC, insert the AC adapter plug into the Compression Module's external power input jack as shown in the center illustration above. As the jack is keyed, the raised notch on the plug must align with the notch on the jack in order for the plug to seat properly and lock into place. To remove the plug, grasp the outer cylinder of the plug barrel and pull, as shown in the right-most illustration above. ***Important:*** Do not attempt to remove the plug without grasping the outer cylinder and pulling down. Failure to do so may result in damage to the AC Adapter and Compression Module and may cause an electrical hazard.

A fully-charged Battery Pack condition is indicated by all-green LEDs on the User Control Panel's Battery Pack status indicator (to determine the Battery Pack's status, see the "Battery Pack Indications and Alarms" charts that follow).

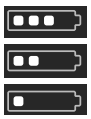
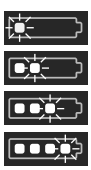
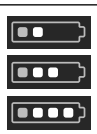
Note: When a Battery Pack is installed into the Compression Module, the Battery Pack charge status can be checked by briefly pressing the Power ON/OFF button. This will cause the Battery Pack indicator LEDs on the User Control Panel to briefly illuminate and display the charge level. *Note:* If all LED indicators on the Control Panel light up and a beep is heard, the Compression Module has been powered on. Press the Power ON/OFF button for at least one second to power off the unit.

Note: The Battery Pack may become unresponsive and non-functional if improperly maintained and left fully depleted. See Section 5.1, *"Routine Unit Maintenance"*, for RMU-2000 ACC maintenance information.

CAUTION

Only use Defibtech-approved accessories with the RMU-2000 ACC. The Battery Pack, Battery Charger, and external power adapter are specifically designed for use with the RMU-2000 ACC. Using other accessories can cause permanent damage and void the warranty.

Battery Pack Indications and Alarms (on User Control Panel)

LED Indications	*Visual Indication*	*Description*	*Action*
All green		Battery Pack charge is >80%	None
Partial green		Number of bars show percent of Battery Pack charge (20% per bar)	None (if possible, charge to full capacity)
Red bar (solid)		Battery Pack low (10-19% charge remaining)	If performing a rescue, replace Battery Pack with a charged Battery Pack or connect external power. Otherwise, charge Battery Pack as soon as possible.
Red bar (fast flashing alarm)		**HIGH PRIORITY ALARM!** Battery Pack low (<10% charge remaining) ***IMPORTANT:*** *If Battery Pack is not replaced or connected to external power immediately, compressions will stop!*	If performing a rescue, replace Battery Pack with a charged Battery Pack or connect external power. Otherwise, charge Battery Pack as soon as possible.
Red bar (fast flashing)		Battery Pack not installed *(Note: Only visible if AC Adapter is connected to Compression Module and is plugged in.)*	Install a charged Battery Pack
		Battery Pack is in ship mode *(Note: Only visible if AC Adapter is connected to Compression Module and is plugged in.)*	Transfer Battery Pack from ship mode to active mode. See 'Ship Mode' in Section 3.10, *"Installing and Removing the Battery Pack,"* for more information.
		Battery Pack malfunction	Replace Battery Pack with a charged Battery Pack
		Battery Pack depleted *(Note: Only visible if AC Adapter is connected to Compression Module and is plugged in.)*	If performing a rescue, replace Battery Pack with a charged Battery Pack or connect external power. Otherwise, charge Battery Pack as soon as possible.
Partial green (slow flashing)		Battery Pack charging	None
Left LED is amber color		Battery Pack has reached end of life	Replace with a new Battery Pack
All off		Battery Pack is not installed	Install a charged Battery Pack
		Battery Pack is in ship mode and AC Adapter is not connected to Compression Module and is not plugged in	Attach AC Adapter to Compression Module and plug in to AC power source to transfer Battery Pack from ship mode to active mode (see *"Ship Mode"* in Section 3.10, *"Installing and Removing the Battery Pack,"* for more information).
		Battery Pack depleted	If performing a rescue, replace Battery Pack with a charged Battery Pack or connect external power. Otherwise, charge Battery Pack as soon as possible.
		Battery Pack malfunction	Replace Battery Pack with a charged Battery Pack

Battery Pack Indications (on Battery Pack)

To check the charge of a Battery Pack while it is not installed in the RMU-2000 ACC, press the button on the bottom of the Battery Pack for about a second. The Battery Pack charge indicator will show the amount of remaining charge:

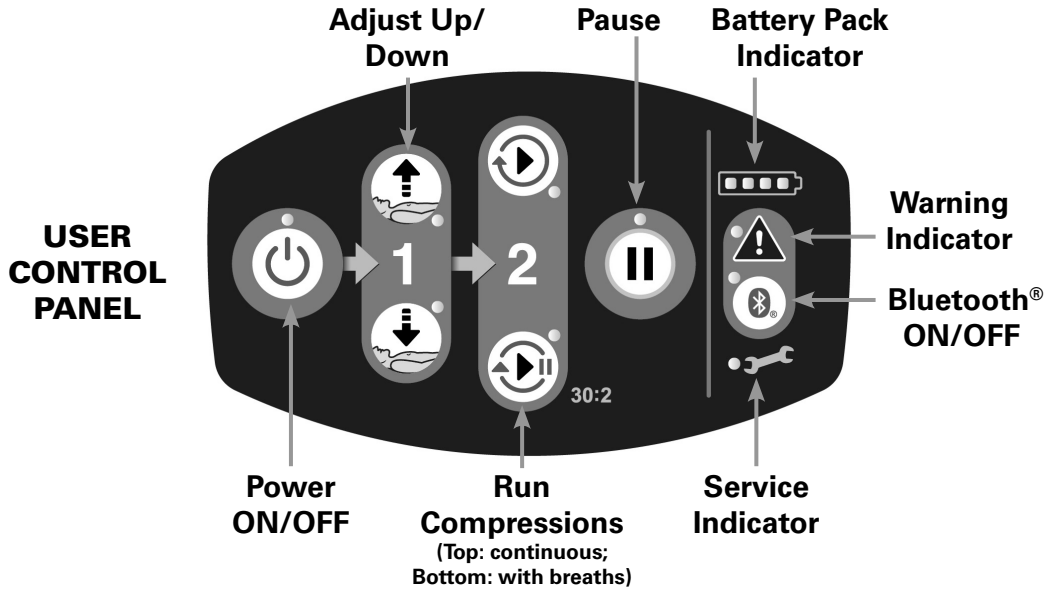
>80%	<80%	<60%	<40%	<20%	<5% (slow flashing red indicator)	In Ship Mode, depleted, or malfunction*

***NOTE:** For more information about Ship Mode, see 'Ship Mode' in Section 3.10, *"Installing and Removing the Battery Pack."* If the Battery Pack indicators do not illuminate after the button on the Battery Pack is pressed, see Section 5.4, *"Troubleshooting"*.

3.12 Assembling and Testing the RMU-2000 ACC

Follow this procedure to perform an initial assembly and test of the RMU-2000 ACC:

1. Attach a Suction Cup to the Frame (see Section 3.5 for details and illustrations).
2. Install a Battery Pack into the Compression Module (see Section 3.10)
3. Turn the unit on by pressing the **Power ON/OFF** button until all Control Panel LEDs briefly illuminate and a beep is heard (see diagram below).
4. Install the Compression Module into the Frame (see Section 3.7) and verify that the Suction Cup has successfully attached to the end of the Piston.
5. Attach the Compression Module and Frame assembly to the Backboard (see Section 3.4).
6. Verify that piston is fully retracted into the Compression Module, the **Warning Indicator** and **Service Indicator** are not illuminated, and the **Battery Pack Indicator** does not indicate malfunction. Charge the Battery Pack if it is not fully charged.
7. Press the **Adjust Down** button to drive the piston to the bottom of its stroke.
8. Press the **Adjust Up** button to bring the piston back to the home position.
9. Turn unit off by pressing and holding the **Power ON/OFF** button for at least one second.



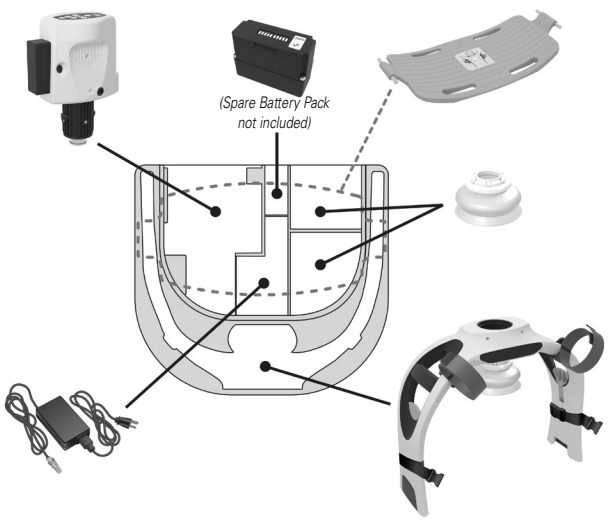
3.13 Disassembling and Storing the RMU-2000 ACC

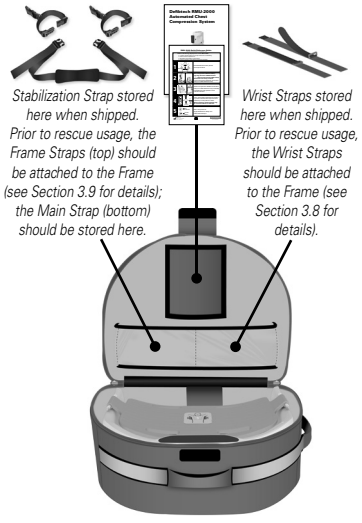
The RMU-2000 ACC should be stored in the Carrying Case. Use the following steps to disassemble and store the unit in the case:

- Remove the Suction Cup from the RMU-2000 ACC by grabbing the edges of the Suction Cup's circular connector ring and pulling down firmly (see Section 3.7 for details and illustrations). Discard the Suction Cup if it has been used on a patient.

WARNING RMU-2000 ACC system components must be cleaned and the Suction Cup replaced between patients to avoid cross-contamination. See Section 5.2 for further cleaning instructions.

- Remove the Compression Module from the Frame by pushing down and rotating the Compression Module approximately 90 degrees in either direction (see Section 3.7). Lift the Compression Module from Frame and place in the appropriate storage section of the Carrying Case. ***Note:*** Always leave a fully-charged Battery Pack inserted in the Compression Module when storing.
- Release the Frame from the Backboard by pressing the Backboard release levers and lifting the Frame from the Backboard (see Section 3.4). Note that the Frame can be released one side at a time.
- Attach the Patient Wrist Straps to the Frame (see Section 3.8)
- Install a Suction Cup onto the Frame (see Section 3.5).
- Place the components, User Manual, and Quick Reference Guide into the Carrying Case as shown in the diagrams below.
- Place at least one spare Suction Cup into the Carrying Case.

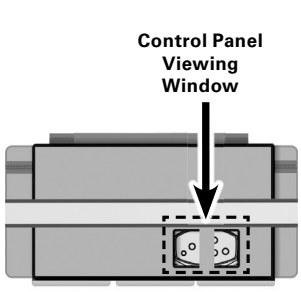




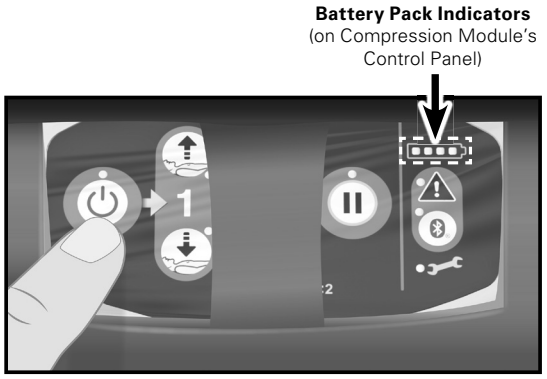
Note: Always store the RMU-2000 ACC in environmental conditions within range of the specifications (see the "Environmental" section in Chapter 8 of this manual).

3.14 Checking and Charging the Battery Pack While in the Carrying Case

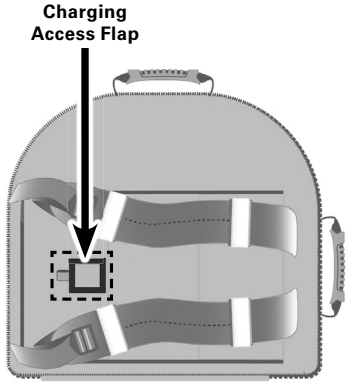
If the Compression Module is stored in the Carrying Case with a Battery Pack installed, the charge level of the Battery Pack can be checked by briefly pressing the Power ON/OFF button through the viewing window located on the underside of the case, as shown here:



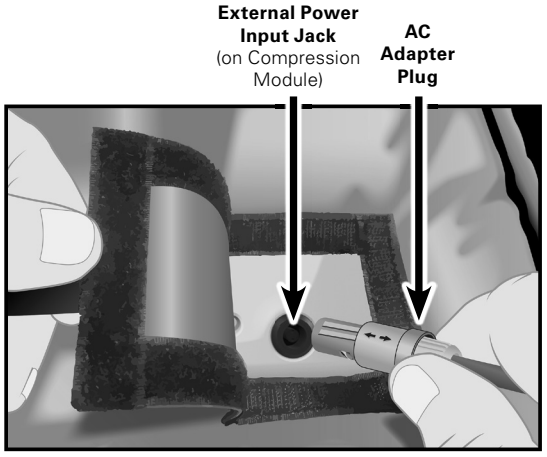
Carrying Case
(bottom view)



The Battery Pack installed in the Compression Module can be charged while remaining inside the Carrying Case. To do this, open the Charging Access Flap located on the back of the Carrying Case and connect the AC Adapter plug to the external power input jack on the Compression Module, as shown here:



Carrying Case
(back view)



For more details about the charging the Battery Pack and the Battery Pack indicators, see Section 3.11.

4 Using the RMU-2000 ACC

This chapter describes how to use the RMU-2000 ACC during an event. The RMU-2000 ACC was designed for simple operation allowing the operator to focus on providing care to the patient.

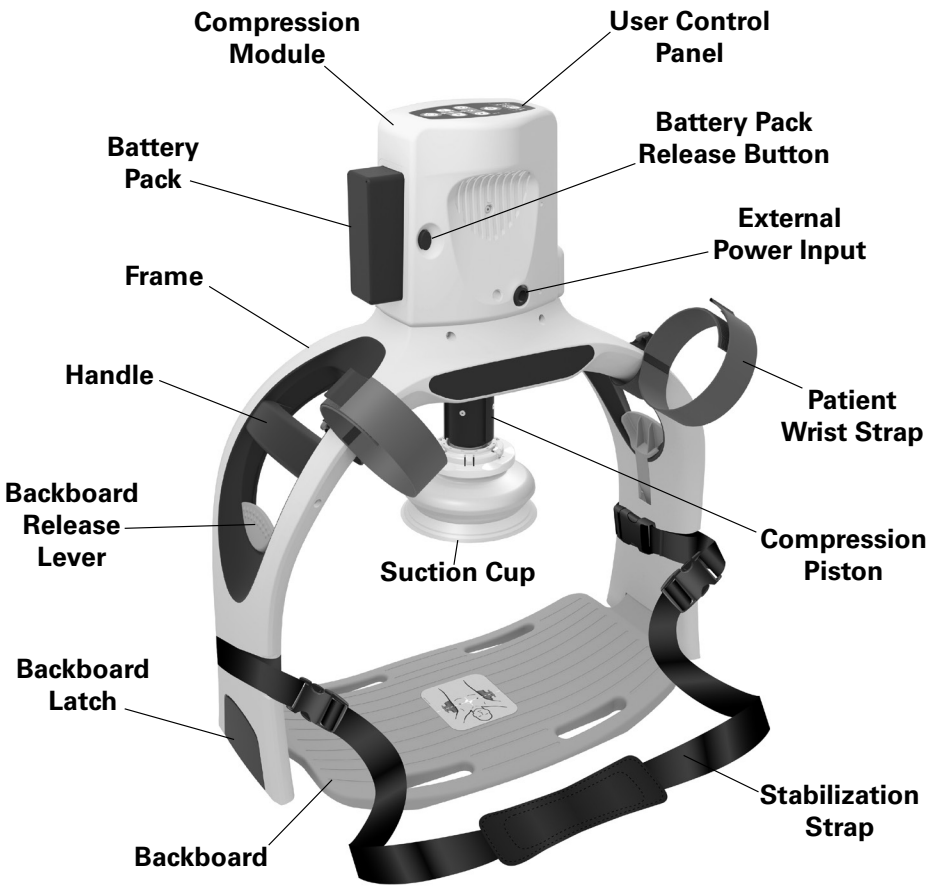
The following sections describe in detail how to use the RMU-2000 ACC. The basic steps for use are:

- Place Backboard under patient and expose chest.
- Turn Compression Module ON by pressing its Power ON/OFF button until all Control Panel LEDs briefly illuminate and a beep is heard. Insert Compression Module into Frame with pre-installed Suction Cup.
- Attach Compression Module and Frame with pre-installed Suction Cup assembly to Backboard, with patient's arms outside of Frame.
- Press and hold the Adjust Down button to position the Suction Cup's Pressure Pad firmly on the patient's chest. When necessary, lift the Suction Cup lip to ensure that air is released.
- Start compressions and apply Stabilization Strap and Patient Wrist Straps.

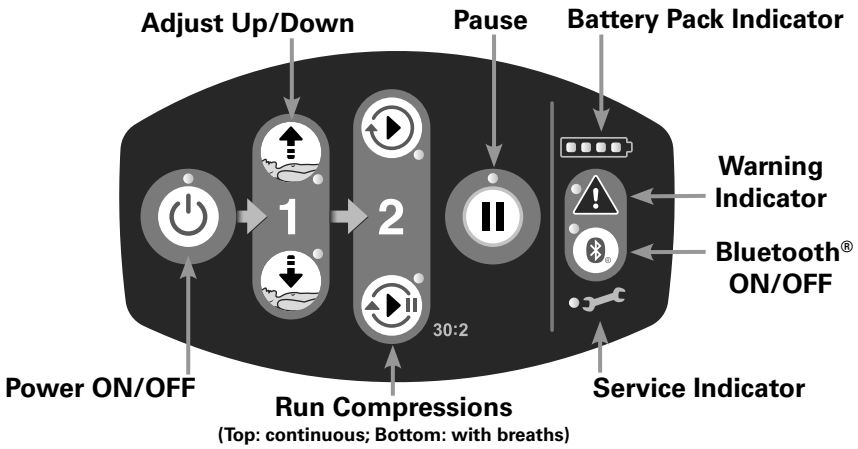
CAUTION

Use and store the RMU-2000 ACC only within the range of environmental conditions specified in the technical specifications.

4.1 Overview



Control Panel



Power ON/OFF Button – To turn on the RMU-2000 ACC, press and hold the Power ON/OFF button until all Control Panel LEDs briefly illuminate and a beep is heard (quickly pressing the Power ON/OFF button will cause the Battery Pack Indicator LEDs on the User Control Panel to briefly illuminate and indicate charge status; the RMU-2000 ACC will not be powered on); press and hold the Power ON/OFF button for at least one second to turn the RMU-2000 ACC off. LED indicators adjacent to the Adjust Up/Down Buttons illuminate and blink when the RMU-2000 ACC is requesting that the piston be adjusted to the patient's chest.

Adjust Up/Down Buttons – These buttons are used to move the Piston up or down relative to the patient's chest. ***Note:*** The two LEDs near the adjustment buttons will flash simultaneously and the Warning Indicator will flash and beep in the event that the RMU-2000 ACC detects that the Piston requires adjustment.

Adjust Up retracts the piston into the Compression Module.

Adjust Down moves the piston toward the patient.

Run Compressions Buttons – These buttons start chest compressions.

The **Run Continuous** button performs compressions until the Pause or Off button is pressed. The adjacent LED flashes at the rate the AHA/ERC/ILCOR suggests for giving rescue breaths without the RMU-2000 ACC stopping for delivery of breaths (approximately 1 breath every 6 seconds).

The **Run With Breaths** button performs compressions according to the compressions-with-breaths protocol and pauses for the operator to give rescue breaths. A reminder chirp and flashing LED occur during the 3 compressions prior to the ventilation pause.

Pause Button – When pressed while the RMU-2000 ACC is running, the Pause button temporarily stops automated therapy (i.e. when giving compressions or while rescue breaths are being delivered). Pushing the Pause button while the unit is paused resumes therapy.

Overview (continued)

Battery Pack Indicator – Indicates the approximate remaining Battery Pack charge. When the Battery Pack is getting low, only one indicator segment will be visible and it will turn red – replace Battery Pack as soon as possible or apply external power (see Section 3.10 for details).

Warning Indicator – The Warning Indicator flashes and beeps to notify the user that the RMU-2000 ACC has encountered a condition that requires the user's attention (e.g. Piston requires position adjustment; see Section 5.4,*"Troubleshooting,"* for more details).

Bluetooth® ON/OFF – The Bluetooth® ON/OFF button allows the Compression Module to be wirelessly connected to a personal computer and for RMU-2000 ACC data retrieval and event reporting when used in conjunction with utility software available at www.defibtech.com.

Service Indicator – The Service Indicator will slowly blink when the RMU-2000 ACC requires preventative maintenance (see Section 5.5,*"Service"* for more details); it will illuminate solidly to indicate that the RMU-2000 ACC may require servicing (see Section 5.4,*"Troubleshooting,"* for more details).

4.2 Arrival and Setup

This section details the steps required to use the RMU-2000 ACC during an emergency. Based on performance testing, the expected deployment time* is approximately 45 seconds and may be less for experienced trained users.

Note: **To minimize CPR interruptions and to most effectively use the RMU-2000 ACC, two rescuers are recommended.**

Note: **Providing manual chest compressions takes precedence over setting up and initiating use of the RMU-2000 ACC.**

Note: **Refer to Section 5.4 ("Troubleshooting") if any problems are encountered during RMU-2000 ACC setup.**

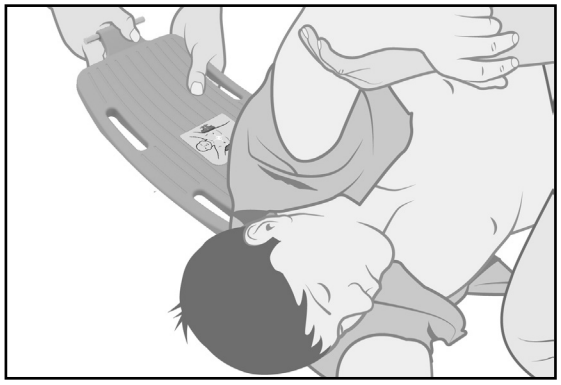
The following instructions are for a two-rescuer scenario.

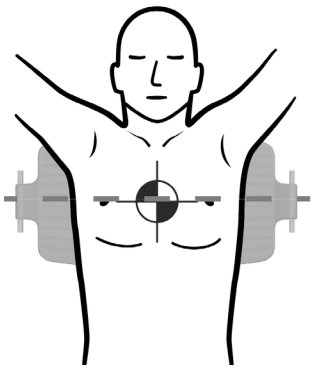
STEP 1) Confirm that the patient is unresponsive and not breathing. Remove clothing from the patient's chest and begin manual CPR immediately.

STEP 2) Open the Carrying Case and remove the Backboard.

*From the time the Backboard is used to the first compression.

STEP 3) Place the Backboard under patient just below armpits. Lift patient body slightly and slide the Backboard under patient or roll patient from side to side, as needed. The center of the Backboard should be in line with the nipple line of the patient. Accurate placement of the Backboard will help with the alignment step later.





STEP 4) Resume manual CPR.

STEP 5) Remove Frame from Carrying Case. Check to make sure a Suction Cup has been pre-installed. If one is not, install a Suction Cup per the instructions in Section 3.5, *"Installing the Suction Cup onto the Frame."*

STEP 6) Remove Compression Module from case. Check to make sure that a Battery Pack is installed. If not, install a Battery Pack per the instructions in Section 3.10, *"Installing and Removing the Battery Pack."*

Arrival and Setup (continued)

STEP 7) Press the Compression Module's Power ON/OFF button until all Control Panel LEDs briefly illuminate and a beep is heard to turn the unit on. If the Battery Pack indicator shows red (low battery), or the RMU-2000 ACC does not turn on, replace the Battery Pack or connect external power (see Section 4.7 *"Power"* for details).

STEP 8) Mount the Compression Module in the Frame by inserting it at approximately 90 degrees to the Frame and twisting the Module in either direction until it is aligned with the Frame and locks in place, as shown below. As the Module is placed onto the Frame, the end of the Piston will push into a connector on the Suction Cup and lock it into place. At the same time that the Piston is locking onto the Suction Cup, the Suction Cup will disconnect from the Frame.

CAUTION

The Compression Module must be assembled and locked into the Frame for proper operation.

Note: Cease use of the RMU-2000 ACC and immediately resume performing manual CPR if:

- The RMU-2000 ACC still fails to power on after Battery Pack replacement.
- The Service Indicator on the Compression Module's Control Panel illuminates solid and the buttons on the Control Panel do not respond when pressed.
- The RMU-2000 ACC cannot otherwise function to deliver automated CPR.

STEP 9) Place the completed Frame and Compression Module assembly over the patient so that the Backboard is aligned with the mounting pins on the Frame. Push down firmly until the Frame latches to the Backboard. Alternatively, attach the side of the Frame nearest to you to the Backboard and then connect the Frame to latch to the opposite side of the Frame. Continue manual CPR compressions while attaching the Frame to the Backboard.

Note: Care must be taken to guide the patient's flesh out of the way of the Backboard Pins when latching the Frame to the Backboard.

WARNING

Keep clothing and other objects from interfering with the Frame latching mechanism when connecting to the Backboard.

STEP 10) Pull up on the Frame and Compression Module assembly to make sure that Frame is securely latched to the Backboard.

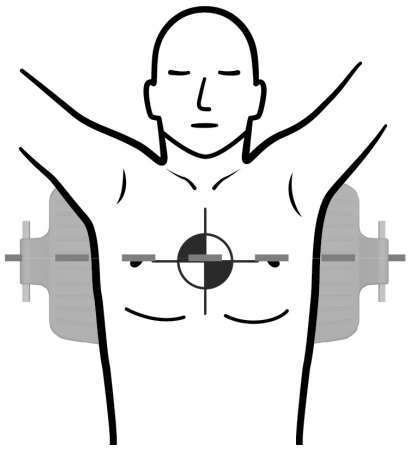
WARNING

If patient is too large for the Frame, remove Frame and continue manual CPR compressions. Do not use the RMU-2000 ACC if the Frame cannot be latched to the Backboard.

Arrival and Setup (continued)

STEP 11) If needed, adjust the Frame and Backboard assembly so that the Suction Cup is positioned over the chest and directly in line with the nipples. For patients with larger breast tissue, the nipple line may not align with the target point on the breastbone.

Note: The compression target point is the same location as that used for manual compressions according to resuscitation guidelines *(Rajab,T et al. Technique for chest compressions in adult CPR. World J Emerg Surg. 2011; 6:41).*

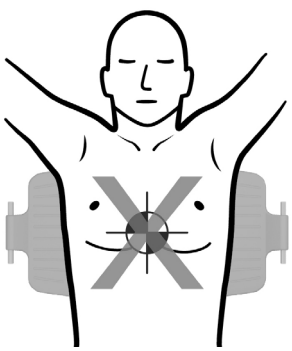


WARNING

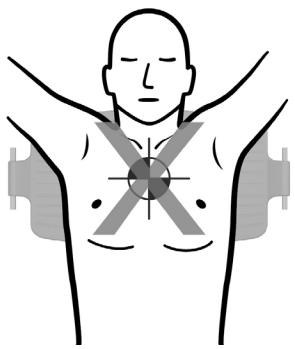
Do not initiate automated chest compressions if a Suction Cup is not attached to the end of the Piston as doing so may result in patient injury. If a Suction Cup is not available, discontinue use of the RMU-2000 ACC and continue performing manual chest compressions.

WARNING

Do not initiate automated chest compressions if the piston is not in the proper position. An incorrect start position may compromise the patient's blood circulation.



Too low

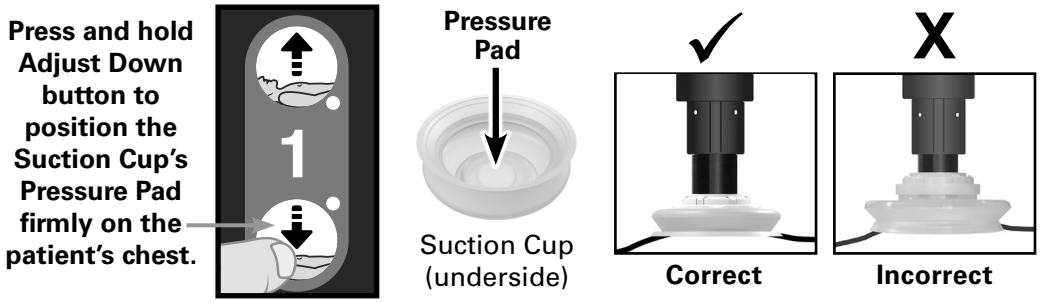


Too high

4.3 Operation and Adjustment

STEP 1) Lower the Piston by pressing ***and holding*** the **Adjust Down** button to position the Suction Cup's Pressure Pad firmly on the patient's chest. ***When necessary, lift the Suction Cup lip to ensure air is released.*** Use the **Adjust Up** and **Adjust Down** to adjust the starting position, as needed.

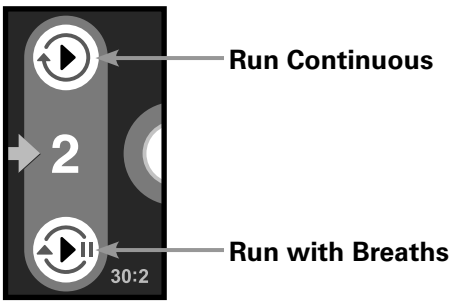
Brassieres or other clothing items located on the patient thorax should be cut or removed to reduce obstructions between the Suction Cup and the patient. If necessary, push breast tissue to the side during Suction Cup positioning such that the target area on the patient thorax is as flat as possible for maximum possible adhesion.



WARNING

If the Piston cannot be adjusted so that the Suction Cup reaches the patient's chest or if the load pressure upon reaching the chest is insufficient for the RMU-2000 ACC to deliver compressions, the patient is too small. Remove Frame and continue with manual CPR compressions.

STEP 2) Once the Piston is properly adjusted, start compressions, in accordance with your emergency response protocol, by pushing the **Run Continuous** button OR the **Run with Breaths** button:



When compressions are initiated, the RMU-2000 ACC gradually reaches full compression depth during the first few seconds of operation by having the initial compressions be of shorter yet incrementally increasing depths.

To temporarily stop compressions for any reason, press the pause button. If necessary, make adjustments to the Suction Cup position using the Adjust Up/Down Buttons so that it is making firm contact with the patient's chest. To resume compressions, push the **Run Continuous** button OR the **Run with Breaths** button.

Compressions may also stop or fail to start because the RMU-2000 ACC requires adjustment to the patient's chest. The RMU-2000 ACC will indicate that adjustment is required by blinking the Adjust Up/Down LEDs. Press the Pause button to clear an adjustment error condition. Readjust the Suction Cup using the Adjust Up/Down Buttons so that it is making firm contact with the patient's chest. To resume compressions, push the **Run Continuous** button OR the **Run with Breaths** button.

Note: The two compression button LEDs will flash simultaneously, the Warning Indicator LED will flash and beep, and automated compressions will halt in the event that the RMU-2000 ACC detects that the Piston position requires adjustment.

Note: While in use, the Compression Module's internal fan may activate in order to maintain an optimal operational temperature level inside the Module. The fan will deactivate when that level has been achieved and may subsequently reactivate, if needed. This behavior is normal.

Note: If there are no user actions after the RMU-2000 ACC is powered on and the device is not performing compressions, the Compression Module will automatically power itself off after 10 continuous minutes of inactivity have elapsed.

WARNING Incorrect position of the Piston over chest can result in injury or lack of effectiveness.

WARNING Incorrect Piston start height can result in injury or lack of effectiveness.

WARNING Carefully monitor the position of the Piston on the patient's chest to ensure that it has not moved from the appropriate target area. Pause compressions and readjust position if needed.

WARNING Changed position over the chest during operation can result in injury or lack of effectiveness.

WARNING Mechanical chest compressions may cause artifact and interfere with ECG analysis. It may be necessary to pause compressions before performing ECG analysis with other equipment.

WARNING When the Battery Pack indicator shows one red segment, this is a high-priority alarm. Replace the Battery Pack as soon as possible with a sufficiently-charged Battery Pack or apply external power.

WARNING Do not leave the RMU-2000 ACC running while unattended. Patient injury may result if the unit is left unattended.

WARNING

Continuously monitor the patient's vital signs and overall physiology while the RMU-2000 ACC is delivering chest compressions.

WARNING

If there is a malfunction, the compressions are not sufficient, or something unusual occurs during operation (e.g. Suction Cup disconnects from Piston during compressions), then push the Power ON/OFF Button for one second to stop the RMU-2000 ACC from delivering compressions and remove the unit from the patient. Start manual chest compressions as soon as possible.

WARNING

If there is a malfunction and the unit will not turn OFF, remove the Battery Pack to stop compressions. Remove the unit from the patient. Start manual chest compressions as soon as possible.

WARNING

Improper operation may injure operator or bystander. Keep fingers and hands away from Piston and Suction Cup during operation.

4.4 Stabilization

To help ensure that the RMU-2000 ACC remains appropriately positioned after compressions have started, attach the Stabilization Strap to the Frame using the procedure that follows.

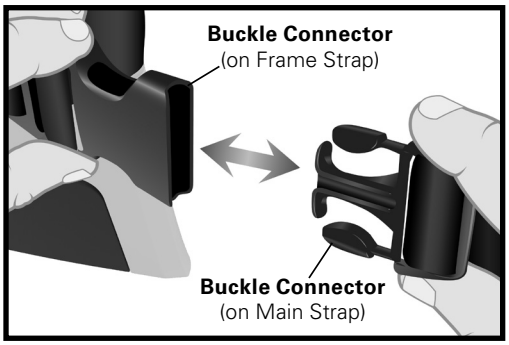
Note: To maximize the available time to perform a rescue, Defibtech recommends that the Stabilization Strap's Frame Straps be affixed to the Frame using the instructions shown in Section 3.9 **prior** to a rescue and that the Frame be stored in the Carrying Case with the Stabilization Strap's Frame Straps already attached to the Frame. If the Frame Straps have **not** been pre-installed onto the Frame, attach them per the procedure described in Section 3.9 and then attach the Main Strap to the Frame Straps, using the procedure that follows.

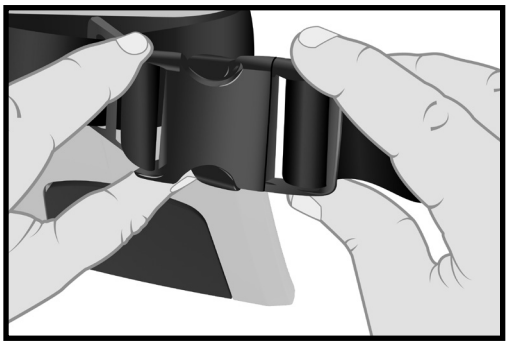
Stabilization Strap Main Strap

IMPORTANT: If the Stabilization Strap is not available, incomplete, or not functioning properly, carefully monitor the position of the Piston on the patient's chest to ensure that it has not moved from the appropriate target area. Pause compressions and readjust position if needed. Also ensure that the patient's head and neck are adequately supported when subsequent transportation of the patient occurs.

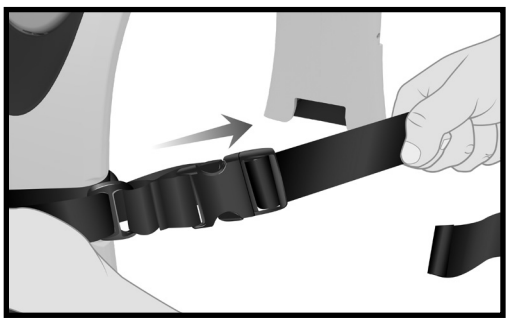
Stabilization (continued)

- Remove the Stabilization Strap's Main Strap (shown on the previous page) from the Carrying Case, if not already at the patient's side.
- Lift patient's head and place the Main Strap behind the patient's neck so that the soft pad is in contact with the back of the patient's neck (the embroidered Defibtech logo should be facing the ground). ***Note:*** Use other accepted patient handling techniques if the patient has or may be suspected to have head, neck, spine or other bone-structure compromising injuries.
- Connect the Main Strap to the Frame Straps by pushing the Main Strap's buckle connectors into the connectors on the Frame Straps until they click and lock into place, as shown here:





- The Stabilization Strap's length can be adjusted by either pulling on the ends of the Main Strap (to tighten) or feeding the strap back through the buckle connector (to loosen), as shown in the illustrations below. Be sure that the Stabilization Strap is sufficiently tightened so that the RMU-2000 ACC's correct position over the patient's chest can be maintained.

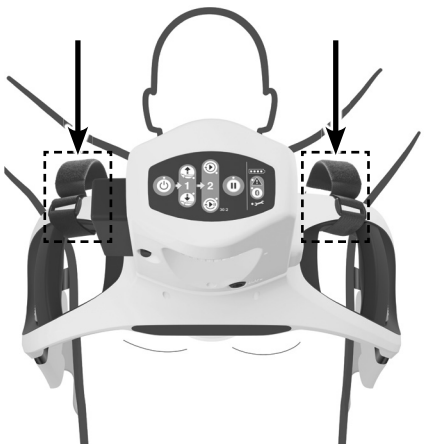


- Make sure the Piston is correctly positioned on patient's chest. If not, stop compressions, loosen the Stabilization Strap and readjust as instructed above. ***Note:*** As with any step in using the RMU-2000 ACC, it is important to minimize the time CPR is not being performed. If the RMU-2000 ACC is not performing compressions for any reason, always consider performing manual CPR.
- To remove the Main Strap, squeeze the Main Strap's buckle connectors until they unlock and release from the Frame Strap's connectors. Place the Main Strap back into the Carrying Case.

4.5 Securing the Patient Wrist Straps to the Patient

Note: To maximize the available time to perform a rescue, Defibtech recommends that the Patient Wrist Straps be affixed to the Frame using the instructions shown in Section 3.5 **prior** to a rescue and that the Frame be stored in the Carrying Case with the Patient Wrist Straps already attached to the Frame. If the Patient Wrist Straps have **not** been pre-installed onto the Frame, attach them per the procedure described in Section 3.8.

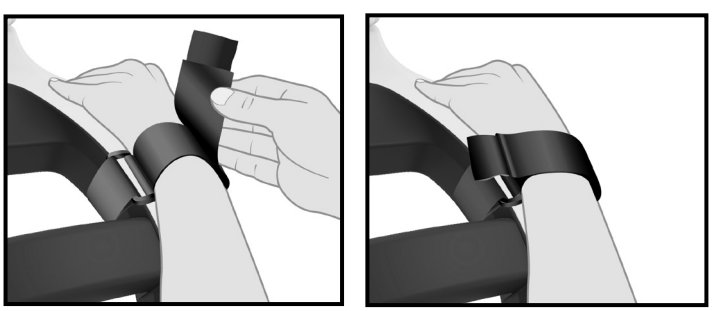
IMPORTANT: If Patient Wrist Straps are not available or do not function properly (e.g. the Velcro is worn out), ensure that the positioning of the patient's arms does not impede rescue efforts or the subsequent transportation of the patient.



As shown in the illustration above, when attaching the Frame to the Backboard, the Patient Wrist Straps can be oriented towards the patient's head to maintain access to the Frame's Backboard Release Levers or on the opposite side of the Frame as appropriate.

To secure the Patient Wrist Straps to the patient's wrists:

- Secure the Forearm Strap of the Patient Wrist Strap by placing the patient's wrist on top of the Forearm Strap and placing the soft Velcro part of the strap across the patient's wrist, as shown in the left illustration below.
- Secure the patient's wrist to the Frame by wrapping the hooked Velcro onto the soft Velcro section, as shown in the right illustration below. Make sure that the strap securely holds the patient's arm in place.



- Repeat the above two steps to secure patient's other arm to the Frame.

Securing the Patient Wrist Straps to the Patient (continued)

Do not over-tighten the Patient Wrist Straps to prevent potential injury. If the Patient Wrist Straps are too loose, they may not securely fasten the patient's arms to the RMU-2000 ACC appropriately.

Observe the patient's arms during use. Do not leave a patient unattended when using the RMU-2000 ACC or its accessories (e.g. Patient Wrist Straps).

Do not obstruct intravenous (IV) access when deploying the RMU-2000 ACC or when attaching the Patient Wrist Straps.

Do not use the Patient Wrist Straps to lift the patient. The straps are intended to attach the patient's arms to the RMU-2000 ACC during transport.

If the RMU-2000 ACC becomes hot, prolonged contact with the patient's skin could result in skin burns. If necessary, remove the patient's arms from the Patient Wrist Straps.

4.6 Transport

Note: Prior to transporting a patient with an affixed RMU-2000 ACC, make sure that the Stabilization Strap has been attached to the unit and that a stretcher or other transportation equipment is nearby.

To move the patient to a stretcher or another piece of transportation equipment:

- Prepare the stretcher/transport equipment near the patient.
- Position two people on either side of the patient. Other personnel may be needed to stabilize the patient's head and limbs, as necessary.
- **When ready to move the patient, push Pause to temporarily stop compressions.**
- Lift the patient by grabbing the Frame's Handle with one hand and use the other hand to support the lower torso by grasping the patient's leg, belt or pants. ***IMPORTANT:*** Do not press the Backboard Release Lever at any time while transporting the patient. Also during transport, do not place hand below the latch point where the Frame connects with the Backboard.
- After the patient is safely on the stretcher/transport equipment, check that the RMU-2000 ACC and the Piston have not changed their position or readjust them to the target area, if necessary.
- Push Pause again or the appropriate Run Compressions button to resume compressions.

During transport, the RMU-2000 ACC can be active if the RMU-2000 ACC and patient are safely and securely positioned on the stretcher/transport equipment and the RMU-2000 ACC remains in the target area and angle on the patient's chest.

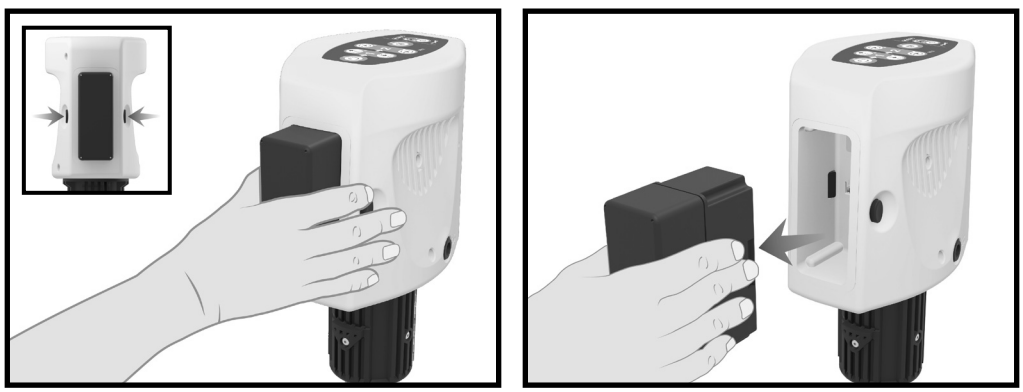
Carefully monitor the position of the piston on the patient's chest to ensure that it has not moved from the appropriate target area. Pause compressions and readjust position if needed.

4.7 Power

If the Battery Pack charge becomes too low to continue delivering automated compressions, the RMU-2000 ACC will stop and the warning and Battery Pack indicators will flash.

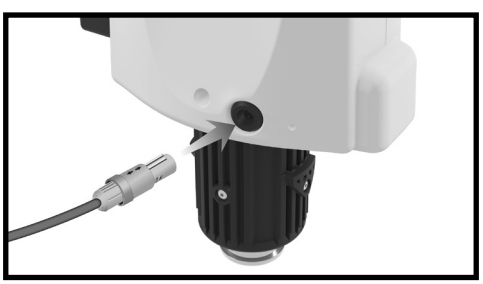
OPTION 1) If a charged spare Battery Pack is available:

- Obtain the spare Battery Pack and have it ready for installation.
- Push Pause to temporarily stop compressions.
- Quickly eject the Battery Pack from the RMU-2000 ACC by pressing the Battery Pack Release and remove the depleted Battery Pack.
- With minimal interruption, install the spare Battery Pack.
- Wait for the Pause LED indicator to illuminate.
- Re-start compressions by pushing the Pause button again or one of the Run buttons.



Note: If the Battery Pack change takes more than approximately 15 seconds, the unit will power off with the piston in place. Upon spare Battery Pack insertion, the Compression Module must be powered on and the piston will automatically retract to reset its reference position. If necessary, lift the edge of the Suction Cup to release suction from the patient's chest before retracting Piston. The piston should then be re-adjusted to the patient's chest.

OPTION 2) At any time, the RMU-2000 ACC can be connected to an external power source by connecting the AC Adapter to the external input jack of the Compression Module (see Section 3.10 for details).



Power (continued)

The Battery Pack must always be installed to operate the RMU-2000 ACC from external power. Without the Battery Pack, the RMU-2000 ACC will flash the warning indicator and will not perform compressions.

Only use Defibtech accessories to power the RMU-2000 ACC from an external power source.

The RMU-2000 ACC must be paused in order to replace a Battery Pack. Failure to do so will require the user to power up the RMU-2000 ACC and reset the start position in order to resume compressions.

If there is a malfunction, the compressions are not sufficient, or something unusual occurs during operation (e.g. Suction Cup disconnects from Piston during compressions), then push the Power ON/OFF Button for one second to stop the RMU-2000 ACC from delivering compressions and remove the unit from the patient. Start manual chest compressions as soon as possible.

If there is a malfunction and the unit will not turn OFF, remove the Battery Pack to stop compressions. Remove the unit from the patient. Start manual chest compressions as soon as possible.

If a spare Battery Pack or external power source are not available and the RMU-2000 ACC stops compressions, remove the unit from the patient and begin manual compressions immediately.

4.8 Other Therapies

The RMU-2000 ACC may be used in conjunction with other therapies such as defibrillation and other patient procedures, as appropriate.

Make sure other equipment and/or drugs are applicable for use with the RMU-2000 ACC. Consult the equipment's operating instructions.

Defibrillation electrodes and pads should not be in contact with and be clear of the Piston, Suction Cup, and other RMU-2000 ACC components.

If the position of the Piston changes as a result of defibrillation or other therapies, immediately stop compressions and re-adjust the position of the RMU-2000 ACC.

Mechanical chest compressions may cause artifact and interfere with ECG analysis. It may be necessary to pause compressions before performing ECG analysis with other equipment.

4.9 Removal from Patient

To remove the RMU-2000 ACC from the patient:

- Turn off the RMU-2000 ACC by pressing and holding the ON/OFF button for at least one second. If necessary, lift the edge of the Suction Cup to release suction from the patient's chest.
- Release the patient's arms from the Patient Wrist Straps by pulling up on the fabric tab on the end of each Forearm Strap until the Velcro is no longer holding the patient's arms in place. Remove the Stabilization Strap's Main Strap (see Section 4.4).
- Remove the Frame and Compression Module assembly from the Backboard (see Section 3.4).

Note: If the patient still requires CPR therapy upon removal of the RMU-2000 ACC, resume manual compressions as soon as possible.

4.10 Post-Use Procedures

After the RMU-2000 ACC has been used on a patient, the unit should be cleaned following procedures in the "Cleaning" section in Chapter 5 of this manual and prepared for the next use. The following steps should be performed:

- Remove and discard the used Suction Cup (see Section 3.7).

RMU-2000 ACC system components must be cleaned and the Suction Cup replaced between patients to avoid cross-contamination.

- Press down and rotate the Compression Module approximately 90 degrees in either direction and lift the Compression Module from the Frame (see Section 3.7).
- The Stabilization Strap's Main Strap and Frame Straps may be removed for cleaning purposes (see Section 5.2) or if they need to be replaced. To remove the Stabilization Strap's Main Strap, squeeze the Main Strap's buckle connectors until they unlock and release from the Frame Strap's connectors (see Section 4.4 for more details). ***Note:*** To maximize the available time to perform a rescue, Defibtech recommends that the Stabilization Strap's Frame Straps be attached to the Frame using the instructions shown in Section 3.9 (*"Attaching the Stabilization Strap Frame Straps to the Frame"*) **prior** to a rescue and that the Frame be stored in the Carrying Case with the Frame Straps already attached to the Frame. The Main Strap should also be stored in a compartment within the Carrying Case (see diagram in Section 3.13,*"Disassembling and Storing the RMU-2000 ACC"*).
- The Patient Wrist Straps may be removed for cleaning purposes (see Section 5.2) or if they need to be replaced. To remove the Patient Wrist Straps from the Frame, pull up on the rounded end of the Frame Strap until it can be slid through the Frame Strap Loop. ***Note:*** To maximize the available time to perform a rescue, Defibtech recommends that the Patient Wrist Straps remain affixed to the Frame and that the Frame be stored in the Carrying Case with the Patient Wrist Straps already attached to the Frame.
- Check all RMU-2000 ACC components for any physical or mechanical damage. If any components are damaged, replace the component if a spare is available. If a spare is not available, contact Defibtech or your distributor for service or to order a replacement.
- Clean all components that have been in contact with the patient (e.g. the Frame and the Backboard) and let them dry (see Section 5.2).
- Install a new Suction Cup onto the Frame (see Section 3.5).
- Replace the Battery Pack with a fully-charged Battery Pack OR fully charge the Battery Pack in the RMU-2000 ACC unit (see Section 3.11) or in the Carrying Case (see Section 3.14).
- Repack the RMU-2000 ACC components and spares into the Carrying Case.
- Follow the routine unit maintenance procedures as defined by the emergency response program's medical director (see Section 5.1).

4.11 Operational Environment

The Defibtech RMU-2000 ACC is designed to operate in a wide range of environmental conditions. To ensure the reliability and safety of the RMU-2000 ACC in a given environment, refer to the "Environmental" section in Chapter 8 of this manual for a detailed list of specified environmental conditions.

5 Maintenance and Troubleshooting

This chapter describes the maintenance and troubleshooting procedures for the RMU-2000 ACC. The unit warnings and alerts are described along with recommended routine maintenance. A troubleshooting guide is provided to help diagnose user serviceable problems.

The RMU-2000 ACC contains no user serviceable parts.

5.1 Routine Unit Maintenance

The RMU-2000 ACC is designed to be very low maintenance. Simple maintenance tasks are to be performed regularly to ensure its readiness (see sample maintenance table below). Different maintenance intervals may be appropriate depending on the environment where the RMU-2000 ACC is deployed, and ultimately the maintenance program is at the discretion of the emergency response program's medical director. As with all rechargeable batteries, the rechargeable Battery Pack self-discharges over time, and therefore, must be maintained in accordance with the User Manual in order to be ready for use.

Weekly	***After Each Use***	***Action***
●	●	Make sure the Battery Pack is fully charged (see Section 3.11, *"Charging the Battery Pack"*).
●	●	Check the condition of the system. Make sure the Carrying Case contains accessories including Suction Cup(s), AC Adapter, Stabilization Strap, and Patient Wrist Straps.
●	●	Make sure a Suction Cup is installed onto the Frame.
●	●	Make sure at least one unused Suction Cup is stored in the Carrying Case.
●	●	Make sure the Patient Wrist Straps and the Stabilization Strap's Frame Straps are attached to the Frame.
●		Check the Battery Pack expiration date.
●	●	Turn the RMU-2000 ACC on to perform a self-test. Make sure the piston is retracted and the PAUSE indicator is illuminated.
●	●	Make sure the Service Indicator is not blinking slowly or solidly lit.
●	●	Test the Piston's mechanical functionality by pressing the Adjust Down button to drive the piston to the bottom of its stroke. When Piston is fully extended, press the Adjust Up button to bring the piston back to the home position.

Note: If the unit has been dropped, mishandled, or abused, a thorough evaluation of operation should be performed.

5.2 Cleaning

The following are important guidelines that must be adhered to when cleaning the RMU-2000 ACC and its accessories:

- **Compression Module, Frame, and Backboard:** When necessary, clean any dirt or contaminants from the RMU-2000 ACC's Frame, Backboard, or Compression Module by using a soft cloth dampened with one of the following recommended cleaning agents:
  – Soapy water
  – Hydrogen peroxide
  – Isopropyl alcohol (70 percent solution)
  – Chlorine bleach (30 ml/liter water)
    - Do not immerse the RMU-2000 ACC's Frame, Backboard, or Compression Module in fluids or allow fluids to enter the unit.
    - Do not spray cleaning solutions directly on the unit or its connectors.
    - Do not use abrasive materials or strong solvents such as acetone or acetone-based cleaning agents.
    - After cleaning, allow the unit to completely dry. Before returning it to service, always turn the unit on for a few seconds. If the unit detects a problem, the Warning Indicator will be illuminated. Otherwise, turn the unit off.
- **Stabilization Strap:** When necessary, clean the Stabilization Strap by detaching the Main Strap from the Frame Straps (see Section 4.4) and detaching the Frame Straps from the Frame (see Section 3.10). Machine wash all components and air dry (do not tumble dry). When dry, Defibtech recommends re-affixing the Frame Straps to the Frame (see Section 3.9). Return the Main Strap to the Carrying Case (see Section 3.13). If the Stabilization Strap cannot be cleaned or is damaged, dispose of it and replace it with a new one.
- **Patient Wrist Straps:** When necessary, clean the Patient Wrist Straps by detaching them from the RMU-2000 ACC and loosening all Velcro. Machine wash and air dry (do not tumble dry). When dry, Defibtech recommends re-affixing the Patient Wrist Straps to the Frame (see Section 3.8). If the Patient Wrist Straps cannot be cleaned, are damaged, or the Velcro is worn out, dispose of them and replace with new ones.
- **Carrying Case:** If the Carrying Case becomes lightly soiled, it can be cleaned using a soft cloth dampened with cold water and off-the-shelf dish washer or laundry detergent. If the Carrying Case becomes heavily soiled, clean using a mixture of 1 quart (1.4 l) of warm water, 1.5 tablespoons (22.2 ml) of off-the-shelf dish washer or laundry detergent, and 1 tablespoon (14.8 ml) of ammonia.

Please note that none of the items provided with the RMU-2000 ACC are sterile or require sterilization.

WARNING

The RMU-2000 ACC is not intended to be sterilized and only approved cleaning agents should be used.

5.3 Storage

The RMU-2000 ACC should be stored in its Carrying Case and placed in a readily accessible location. In general, the unit should be stored in clean, dry and moderate temperature conditions. Make sure that the environmental conditions of the storage location are within the ranges detailed in the "Environmental" section in Chapter 8 of this manual.

Note: If stored outside of the Compression Module, a Battery Pack in active mode (see Section 3.11 for details about battery states) should be fully charged at least every 6 months. If stored in the Compression Module, the Battery Pack should be fully charged at least every 2 months.

5.4 Troubleshooting

The following table lists the symptoms, the possible causes, and the possible solutions for common problems. Refer to the other sections of this user manual for detailed explanations on how to address any issues. If the unit continues to be non-functional, return the unit for servicing. (refer to Chapter 10 of this manual for contact information).

Symptom/Observation	*Possible Cause*	*Corrective Action*
RMU-2000 ACC will not turn on	On/Off button pressed but not held down for at least one second	Press and hold the On/Off button for a full one second. All Control Panel LEDs will briefly illuminate and a beep will be heard when the RMU-2000 ACC is powered on.
	Battery Pack is not installed	Install a charged Battery Pack (see Section 3.10).
	Battery Pack is in ship mode	Connect and plug in the AC Adapter to activate the Battery Pack. For more details, see "Ship Mode" in Section 3.10, *"Installing and Removing the Battery Pack."*
	Battery Pack depleted	Charge the depleted Battery Pack (see Section 3.11) or replace the depleted Battery Pack with a charged Battery Pack (see Section 3.10).
	Battery Pack malfunction	Replace the Battery Pack with a charged Battery Pack (see Section 3.10).
	RMU-2000 ACC malfunction	Remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible.
RMU-2000 ACC immediately turns off	Battery Pack is depleted	Charge the depleted Battery Pack (see Section 3.11) or replace the depleted Battery Pack with a charged Battery Pack (see Section 3.10).
	Battery Pack malfunction	Replace the Battery Pack (see Section 3.10).
	RMU-2000 ACC malfunction	Remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible.
Battery Pack Indicator on the User Control Panel is red	Battery Pack has less than 20% charge remaining	If performing a rescue, replace the Battery Pack with a charged Battery Pack or connect external power (see Section 4.7). Otherwise, charge the Battery Pack as soon as possible (see Section 3.11).
Battery Pack Indicator on the User Control Panel is quickly flashing red during compressions	**HIGH PRIORITY ALARM!** Battery Pack has less than 10% charge remaining ***IMPORTANT:*** *If the Battery Pack is not replaced or the RMU-2000 ACC is not connected to external power immediately, compressions will stop!*	If performing a rescue, replace the Battery Pack with a charged Battery Pack or connect external power (see Section 4.7). Otherwise, charge the Battery Pack as soon as possible (see Section 3.11).

Troubleshooting (continued)

Symptom/Observation	***Possible Cause***	***Corrective Action***
Battery Pack Indicator on the User Control Panel is quickly flashing red (compressions not running)	Battery Pack is not installed	Install a charged Battery Pack (see Section 3.10).
	Battery Pack malfunction	Replace the Battery Pack with a charged Battery Pack (see Section 3.10).
	Battery Pack depleted	If performing a rescue, replace the Battery Pack with a charged Battery Pack or connect external power (see Section 4.7). Otherwise, charge the Battery Pack as soon as possible (see Section 3.11).
First LED of the Battery Pack Indicator on the User Control Panel is amber	Battery Pack has reached end of life	Replace the Battery Pack with a new Battery Pack as soon as is practical (see Chapter 6 for ordering information; see Section 3.10 for installation instructions).
Battery Pack Indicators on the Battery Pack do not illuminate after the button on the Battery Pack is pressed	Battery Pack is in ship mode	Connect and plug in the AC Adapter to activate the Battery Pack. For more details, see "Ship Mode" in Section 3.10, *"Installing and Removing the Battery Pack."*
	Battery Pack depleted	Charge the Battery Pack as soon as possible (see Section 3.11).
Warning Indicator flashing; audible alert (beeping); compressions stop (if running)	The RMU-2000 ACC has detected a problem	Check for proper Piston position and height. Press the Pause button to clear the condition and try again (see Section 4.3). If the condition persists, remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible.
Compression Module fails to lock into Frame	Damaged Compression Module Locking Sleeve or damaged Module Receptacle on Frame from extended use	Immediately push the Pause Button to pause compressions. Attempt to realign Compression Module to the Frame. If realignment is successful, resume automated compressions. If realignment is not successful, cease use of the RMU-2000 ACC and continue to perform manual chest compressions. Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Suction Cup fails to attach to the Frame	Damaged Suction Cup or damaged Frame	If the Suction Cup fails to attach to the Frame, attempt to attach a spare Suction Cup to the Frame or install the Compression Module into the Frame and affix the Suction Cup directly to the end of the Piston. If the condition persists or if a spare Suction Cup is not available, cease use of the RMU-2000 ACC and continue to perform manual chest compressions. Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Suction Cup fails to attach to the end of the Piston when the Compression Module is attached to the Frame with a pre-installed Suction Cup	Damaged Suction Cup, damaged Frame, or damaged Piston.	While the Compression Module is installed in the Frame, attempt to affix the Suction Cup directly to the end of the Piston. If the Suction Cup fails to attach to end of Piston, discard the Suction Cup and attempt to attach a spare Suction Cup to the end of the Piston. If the condition persists or if a spare Suction Cup is not available, cease use of the RMU-2000 ACC and continue to perform manual chest compressions. Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Circular connector ring on the Suction Cup (see Section 3.7) becomes cracked or damaged during compressions	Damaged connector ring on Suction Cup	***IMPORTANT:*** *Allow the RMU-2000 ACC to continue to deliver automated compressions, as the detached connector ring will not impede or prevent therapy.* After rescue use of the RMU-2000 ACC has concluded, replace the damaged Suction Cup with a new one (see Section 3.7 *"Installing and Removing the Compression Module and Suction Cup"*).

Troubleshooting (continued)

Symptom/Observation	***Possible Cause***	***Corrective Action***
Suction Cup detaches from the Piston during compressions	Damaged Suction Cup or damaged Piston.	**Immediately** push the On/Off Button for one second to power off the RMU-2000 ACC. Attempt to reaffix the Suction Cup directly to the end of the Piston. If reconnection is successful, resume automated compressions. If reconnection is not possible due to a lack of adequate space between the end of the Piston and the patient's chest, remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible. Remove the Compression Module from the Frame and attempt to reattach the Suction Cup to the Frame. Reinsert the Compression Module into the Frame. If the Suction Cup fails to attach to the end of the Piston, discard the Suction Cup and attach a spare Suction Cup to the Frame and retry the operation. If the condition persists or if a spare Suction Cup is not available, cease use of the RMU-2000 ACC and continue to perform manual chest compressions. Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information). ***IMPORTANT:*** *Whatever corrective measures are attempted to reattach the Suction Cup to the Piston during a rescue, it is critical that chest compressions be as minimally interrupted as possible.*
Frame latch(es) is/are jammed and the Frame cannot be fully or partially detached from the Backboard	Damaged Frame latch(es) or damaged backboard.	If only one latch is jammed and the other latch is functioning, open up the Frame on one side so that the Frame and Backboard assembly can be slid out and removed from the Patient. If both latches are jammed, carefully lift and pull patient out of the fully-connected Frame and Backboard assembly head first. If necessary, resume manual chest compressions.
Adjust Up/Down LED indicators blinking	Piston position adjustment required	Adjust the Piston until it is firmly touching the patient's chest (see Section 4.3). Retry compressions. If condition persists, push the On/Off Button for at least one second to power off the RMU-2000 ACC. Retry Operation and Adjustment (see Section 4.3). If condition persists after troubleshooting, remove the RMU-2000 ACC from patient (see Section 4.9) and start manual chest compressions as soon as possible.
RMU-2000 ACC fails to start compressions	Piston position adjustment required or RMU-2000 ACC malfunction	
RMU-2000 ACC stops during compressions		
Compressions are not sufficient, or something unusual occurs during operation		
Adjust Up, Adjust Down, and Run Compressions buttons on the Compression Module are unresponsive	Compression Module may be retrieving data to a PC via a Bluetooth® connection	Press the Bluetooth® ON/OFF button to disable Bluetooth® communication and continue with deployment of the RMU-2000 ACC. If the buttons continue to be unresponsive after the Bluetooth® connection is severed, remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible.

Troubleshooting (continued)

Symptom/Observation	***Possible Cause***	***Corrective Action***
Bluetooth® connection between the Compression Module and a host PC cannot be established or is intermittent	Initial Bluetooth® pairing or reconnection procedures not followed correctly	Follow the "Initial Pairing" or "Reconnecting" procedures in Section 7.2. If Bluetooth® connection still cannot be established, power off the Compression Module, and power it back on. Retry the appropriate procedure from Section 7.2 or connect the Compression Module to the PC via a wired connection using the USB port on the underside of the Compression Module (see Section 7.3). If needed, contact Defibtech customer service for assistance (see Chapter 11 for contact information).
	Compression Module is too far away from the PC and/ or barriers (e.g. walls, metal objects) are interfering with wireless connectivity	Move the Compression Module closer to the PC and/ or reposition the Compression Module so that as few barriers as possible exist between it and the PC.
	Compression Module is malfunctioning or damaged	Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Wired USB connection between the Compression Module and a host PC cannot be established, is slow, or is intermittent	USB cable connectors are not fully seated in the USB ports on the Compression Module and/or the host PC	Check USB connection points on the Compression Module and host PC; reseat if necessary.
	USB cable is malfunctioning or damaged	Replace the USB cable with a new one or connect the Compression Module and the host PC wirelessly via Bluetooth® (see Section 7.2).
	Compression Module is malfunctioning or damaged	Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Service Indicator is slowly blinking	The RMU-2000 ACC requires preventive maintenance (see Section 5.7 for details)	The RMU-2000 ACC will perform a rescue properly. Have the RMU-2000 ACC serviced as soon as is practical (see Chapter 11 for contact information).
Service Indicator is solidly lit	The RMU-2000 ACC may require service	The RMU-2000 ACC might not perform a rescue properly. If the Control Panel buttons are not responsive when pressed, remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible. Have the RMU-2000 ACC serviced as soon as possible (see Chapter 11 for contact information).

If the error condition persists or service is required, call your Authorized Distributor or Defibtech. Refer to Chapter 11 of this manual for contact information.

5.5 Service

Defibtech recommends preventative maintenance every 18 months of use. After 18 months or 1.2 million compressions (whichever comes first), the Service Indicator LED will slowly flash to indicate that, while the RMU-2000 ACC is still functional, it is requesting preventative maintenance. ***Note:*** Data retrieval and event reporting software can be used to ascertain what the compression count total is for the RMU-2000 ACC or how much time remains until the 18-month preventative maintenance threshold is reached (see Section 7.1 for details).

Note: If the Service Indicator LED lights up solidly, the RMU-2000 ACC has encountered a technical problem that may require that the RMU-2000 ACC be serviced as soon as possible.

If the unit needs servicing or repair of any kind, call your Authorized Distributor or Defibtech for shipping instructions and general assistance (see Chapter 11, *"Contacts"*).

WARNING

No modification of this equipment is allowed. The RMU-2000 ACC contains no user-serviceable parts.

5.6 Recycling Information

At the end of useful life, recycle the RMU-2000 ACC and its accessories.

Recycling Assistance

For recycling assistance contact your local Defibtech distributor.
Recycle in accordance with local and national regulations.

Preparation For Recycling

Items should be clean and contaminant-free prior to being recycled.
When recycling used items, follow local clinical procedures.

Packaging For Recycling

Packaging should be recycled in accordance with local and national requirements.

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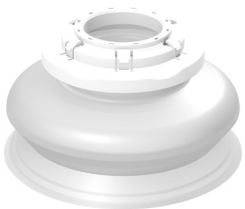
6 RMU-2000 ACC Accessories

This chapter describes the component parts and the accessories that can be used with the Defibtech RMU-2000 ACC. For contact information on obtaining replacement component parts and accessories, refer to Chapter 11 in this manual.

6.1 Suction Cup

The Suction Cup is a user-replaceable, single-use component that provides the interface between the piston and the patient's chest.



6.2 Battery Pack

The Battery Pack provides a replaceable primary power source for the Compression Module.

6.3 External AC Adapter

The external AC Adapter provides external power to run the RMU-2000 ACC and charge the installed Battery Pack.

Note: A Battery Pack must be installed to operate the RMU-2000 ACC using an external power source.

6.4 Stabilization Strap

The Stabilization Strap is used to stabilize the RMU-2000 ACC while compressions are being applied by the unit to the patient (see Section 4.4 *"Stabilization"* for details).

6.5 Patient Wrist Straps

The Patient Wrist Straps attach a patient's arms to the RMU-2000 ACC for ease of transporting the patient and the RMU-2000 ACC (see Sections 3.8 and 4.5 for details).

6.6 USB Cable

The USB Cable (USB-A to Mini-B) allows the Compression Module to be physically connected to a personal computer and for RMU-2000 ACC data retrieval and event reporting when used in conjunction with utility software available at www.defibtech.com. The RMU-2000 ACC's USB port is located on the bottom of the Compression Module (see Section 7.3 *"USB Port"* for details). For more information, contact Defibtech or your authorized distributor (see Chapter 11, *"Contacts"*).

The USB Cable is intended for post-event data retrieval and is not intended for use during RMU-2000 ACC device operation.

6.7 Battery Pack Charging Station

The Battery Pack Charging Station is an optional accessory that charges up to two Battery Packs simultaneously. For more information, visit www.defibtech.com or contact Defibtech or your authorized distributor (see Chapter 11, *"Contacts"*).

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7 Data Retrieval and Event Reporting

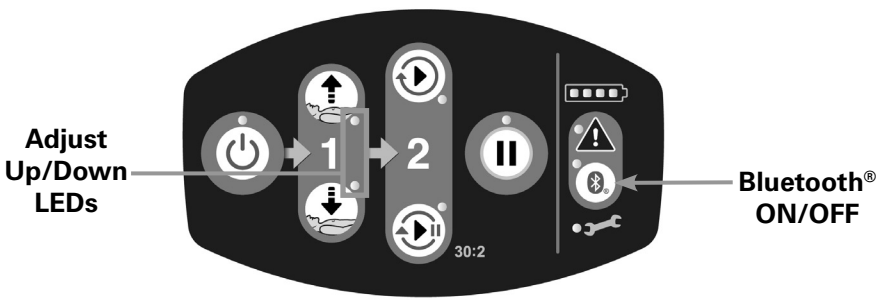
This chapter includes information about data retrieval and event reporting software and the methods by which the Compression Module can be linked to a personal computer to retrieve internal data.

7.1 Data Retrieval and Event Reporting Utility Software

Data retrieval and event reporting utility software allows the Defibtech RMU-2000 Automated Chest Compression (ACC) System's Compression Module to connect to a personal computer via Bluetooth® or USB to retrieve device data as well as generate event summary reports using this retrieved information. This downloadable PC-based software and installation instructions (including minimum system requirements) are available at www.defibtech.com/acc-software.

7.2 Bluetooth® Wireless Technology

The Bluetooth® ON/OFF button on the Compression Module's Control Panel allows the Compression Module to be wirelessly connected to a personal computer for RMU-2000 ACC data retrieval and event reporting when used in conjunction with the utility software described in Section 7.1. Bluetooth® wireless connectivity is intended for post-event data retrieval and is not intended for use during RMU-2000 ACC device operation.



Initial Pairing (establishing a wireless connection between a PC and a Compression Module for the first time):

1. Press and hold the Compression Module's Bluetooth® ON/OFF button for at least 2 seconds until the blue LED to the left of the button starts to blink quickly (its blinking rate should be **in sync** with the two green LEDs near the Adjust Up/Adjust Down buttons).
2. On the PC, select "RMU Data" from the list of available Bluetooth® devices.
3. If connection has been successfully established between the PC and the Compression Module, the blue LED to the left of the Bluetooth® ON/OFF button will cease blinking and be solidly lit.
4. After successfully pairing, use the reconnecting procedure defined below to reestablish a Bluetooth® connection between the Compression Module and the PC to which it has been paired (do not re-pair).

Reconnecting (re-establishing a wireless connection between an already-paired PC and Compression Module):

1. Briefly press the Compression Module's Bluetooth® ON/OFF button which will cause the blue LED to the left of the button to blink slowly (its blinking rate should be **out of sync** with the two green LEDs near the Adjust Up/Adjust Down buttons).
2. Connection between the PC and the Compression Module should happen automatically, at which time the blue LED to the left of the Bluetooth® ON/OFF button will cease blinking and be solidly lit.

After the Compression Module and an external device have been successfully paired, the blue LED to the left of the Bluetooth® ON/OFF button will be solidly lit. Pressing the Bluetooth® ON/OFF button while Bluetooth® is on disables Bluetooth® and disconnects the Compression Module from any external devices connected via Bluetooth®. The blue LED to the left of the Bluetooth® ON/OFF button will no longer be illuminated.

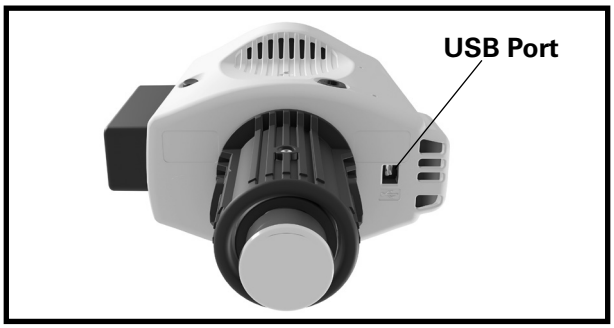
Note: If the Adjust Up, Adjust Down, and Run Compressions buttons are unresponsive, the Compression Module may be retrieving data to a PC via a Bluetooth® connection. If this occurs, press the Bluetooth® ON/OFF button to disable Bluetooth® communication and continue with deployment of the RMU-2000 ACC. If the buttons continue to be unresponsive after the Bluetooth® connection is severed, remove the RMU-2000 ACC from the patient (see Section 4.9) and start manual chest compressions as soon as possible.

Note: If more than 3 minutes elapse after Bluetooth® is enabled via the Bluetooth® ON/OFF button and no connection is established with an external device, the Compression Module will automatically disable Bluetooth® and the blue LED will no longer be illuminated.

Note: Bluetooth® wireless connectivity can also be established via the data retrieval and event reporting software described in Section 7.1 (for more details, see the software instructions available for viewing and download at www.defibtech.com/acc-software).

7.3 USB Port

A USB Port (Mini-B) is located on the bottom of the Compression Module. It allows the Module to be connected to a personal computer when a wired connection is preferred or when a Bluetooth® connectivity is not possible or desired. It is not intended to be used during rescue operation.



WARNING

Do not use the USB cable during emergency use as it interferes with patient care.

7.4 Event Data

As part of Defibtech's on-going regulatory compliance activities, event data shared with Defibtech may be used by Defibtech to fulfill regulatory obligations. Any identifying personal data or health information received is considered confidential within Defibtech and will not be used for any other purpose. Please contact Defibtech at support@defibtech.com should there be any further questions.

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8 Technical Specifications

8.1 Defibtech RMU-2000 ACC

General

Category	*Specification*
Size (assembled)	25 x 20 x 9 inches (63.5 x 50.8 x 22.9 cm)
Size (in carrying case)	21 x 19 x 11 inches (53.3 x 48.3 x 28.0 cm)
Weight (with Battery Pack)	16.4 lbs. (7.5 kg)
Power	Rechargeable Battery Pack or 24V DC input with Battery Pack installed
Design standards	Meets applicable requirements of • IEC 60601-1 • ANSI/AAMI ES60601-1 • CAN/CSA C22.2 60601-1 • IEC 60601-1-2
Device classification	Internally powered Class II (with external power source)

Patient and CPR

Category	*Specification*
Patients eligible for treatment	Adult patients that fit into the device: • sternum height of 7.4 to 12.7 inches (18.8 to 32.3 cm) • maximum chest width of 17.5 inches (44.4 cm) The use of the RMU-2000 ACC device is not restricted by patient weight.
Compression depth	1.5 to 2.4 inches (38 to 60 mm) ±0.1 inches (±2 mm) determined by anterior-posterior diameter of patient chest from piston position
Compression frequency	100 – 110 ±1 compressions per minute
Compression duty cycle	50% ±5%
Compression mode	Continuous compressions
Protocol mode	30:2 (30 compressions followed by a 3-second ventilation pause for 2 rescue breaths; audio indication prior to each ventilation pause)
Ventilation indications	8/min or 10/min (Run Compressions LED blinks for ventilation indication 10 times per minute)
Suction Cup adjustments	The user presses the Adjust Down or Adjust Up buttons to adjust the position of the Suction Cup.
Pressure Pad release	To allow for chest rise (e.g. during asynchronous ventilation or spontaneous gasping), the device can be set up so that the Pressure Pad moves up to 0.6 inches (15 mm) above the start position at every compression.

Environmental

Category	***Specification***
Operating/maintenance temperature	0 – 40°C (32 – 104°F)
Standby/storage/transport temperature	-20 – 60°C (-4 – 140°F) The maximum time required for the device to adapt to operating temperature after storage is 2 hours.
Humidity	5% – 95% (non-condensing)
Rating	Internally powered, defibrillator proof, type BF. Defibrillation recovery time: <10s
Sealing/water resistance	IEC 60529 class IP43 (Battery Pack installed)
Electromagnetic compatibility (emissions and immunity)	• IEC 60601-1-2 (refer to Chapter 9 for details) • AIM 7351731 • EN 55025/CISPR 25
Atmospheric pressure	620 - 1060 hPa per IEC 60601-1-12
Radio module	Silicon Labs BT121 Bluetooth® Module Modulation Type: BDR/EDR Frequency range: 2.402 – 2.480 GHz Radio frequency: Output Power 12/9 dBm typical, 14/11 dBm max ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.2 (2019-12) FCC Part 15.209:2020 Contains Transmitter Module FCC ID: QOQBT121
Data transmission	The device can send device data (for example: event data and device status). Bluetooth® availability: On/Off

CAUTION The RMU-2000 ACC should not be used in aircraft environments.

8.2 Battery Pack

Use only Defibtech Battery Packs in the RMU-2000 ACC.

RBP-1000 Battery Pack

Category	*Specification*
Model number and battery type	**RBP-1000-EC** and **RBP-1000-JG**: 18.25V, 5300mAh, Lithium-ion; Rechargeable, recyclable **RBP-1000-KG**: 18.0V, 5600mAh, Lithium-ion; Rechargeable, recyclable
Operation time	1 hour (nominal patient)*
Battery Pack charge time	Less than 3 hours in ACC* Less than 2 hours if charging one Battery Pack in optional external battery pack charging station (less than 3 hours if charging two Battery Packs; see Section 6.7 for details)*
Battery Pack useful life	Recommended to replace Battery Pack every 3 years or if Battery Pack indicator displays a replace Battery Pack condition (~300 charge/discharge cycles**).
Battery Pack operating and charging temperatures	0 – 40°C (32 - 104°F) ambient
Storage temperature	0 – 40°C (32 – 104°F); -20 – 60°C (-4 – 140°F) short-term <1 month.
Sealing / water resistance	IEC 60529 class IP44

*typical, new battery, at 25°C

**one charge/discharge cycle is defined as charging and discharging the full capacity of the Battery Pack

8.3 AC Power Adapter

RPM-2000 External AC Power Adapter

Category	*Specification*
Model number	RPM-2000
Input voltage	100 – 240VAC, 50/60Hz nominal
Input current	1.5A
Rated output	24.0VDC (±5%)
Maximum input cable length	80.7 inches (205 cm)
Maximum output cable length	62.2 inches (158 cm)
Operating / storage temperature	See *"Environmental"* specifications chart in Section 8.1
Emissions and immunity	Refer to Chapter 9 for details

8.4 Notice to European Union Customers

The crossed-out wheeled bin symbol indicates that this equipment is included in the scope of the directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) and of the national decree(s), which transpose provisions of such directive.

At the end of its lifetime, this equipment can only be disposed of in compliance with the provisions of the above-mentioned European directive (and as amended) as well as with the corresponding national regulations. Severe penalties are possible for unauthorized disposal.

Electrical and Electronic Equipment (EEE) may contain polluting components and hazardous substances, the accumulation of which could pose serious risk for the environment and human health. It is for this reason that local administrations provide regulations, which encourage reuse and recycling, and prohibit the disposal of WEEE as unsorted municipal waste and require the collection of such WEEE separately (at specifically authorized treatment facilities). Manufacturers and authorized distributors are required to supply information about a safe treatment and disposition of the specific equipment.

You may also return this equipment to your distributor when purchasing a new one. As for reuse and recycling, notwithstanding the limits imposed by the nature and the use of this equipment, the manufacturer will do its best to develop recovery processes. Please contact the local distributor for information.

9 Electromagnetic Conformity

9.1 Guidance and Manufacturer's Declaration

The RMU-2000 ACC is intended for use within the electromagnetic environment specified below. The customer or the user of the RMU-2000 ACC should assure that it is used within the stated environmental specifications.

The following electromagnetic conformity tables and relevant warnings and cautions apply to the RBC-1000 Battery Pack Charging Station optional accessory as well.

Electromagnetic Emissions

Emissions test	*Compliance*	*Electromagnetic environment – guidance*
RF emissions EN 55011/CISPR 11	Group 1 Class B	The RMU-2000 ACC uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Harmonic emissions IEC/EN 61000-3-2	Class A	The RMU-2000 ACC is suitable for use in all buildings including domestic homes and places directly connected to the public low-voltage Power Supplies Network that supplies buildings used for domestic purposes.
Voltage fluctuations/flicker emissions IEC/EN 61000-3-3	Complies	

Electromagnetic Immunity

Immunity test	*IEC 60601 test level*	*Compliance level*	*Electromagnetic environment – guidance*
Electrostatic discharge (ESD) IEC/EN 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	There are no special requirements with respect to electrostatic discharge.
Electrical fast transient/burst IEC/EN 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines Not applicable for input/output lines	The mains power quality must be that of a typical commercial or hospital environment.
Surge IEC/EN 61000-4-5	±1 kV line-to-line ±2 kV line-to-ground	±1 kV line-to-line Not applicable for line-to-ground	The mains power quality must be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC/EN 61000-4-11	Ut = 0%, 0.5 cycle Ut = 0%, 1 cycle Ut = 70%, 25 cycles Ut = 0%, 250 cycles	Ut = 0%, 0.5 cycle Ut = 0%, 1 cycle Ut = 70%, 25 cycles Ut = 0%, 250 cycles	The mains power quality must be that of a typical commercial or hospital environment. If the user of the [Equipment or System] requires continued operation during power mains interruptions, Defibtech recommends that the [Equipment or System] is energized from a Power Supply or Battery Pack that cannot be interrupted.
Power frequency (50/60 Hz) magnetic field IEC/EN 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should not be greater than levels characteristic of a typical location in a commercial or hospital environment.

Electromagnetic Immunity (continued)

Immunity test	***IEC 60601 test level***	***Compliance level***	***Electromagnetic environment – guidance***	
Radiated RF IEC/EN 61000-4-3	10 V/m 80 MHz to 2.7 GHz	20 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the RMU-2000 ACC, including cables, than necessary. The recommended separation distance calculated from the equation applicable to the frequency of the transmitter is shown in the following table.	
Conducted RF IEC/EN 61000-4-6	3 Vrms (150 kHz to 80 MHz) 6 Vrms (ISM and Amateur bands) (Professional and Home Healthcare Environments)	10 Vrms (0.15 to 80 MHz) 6 Vrms (ISM and Amateur bands)		Interference may occur in the vicinity of equipment marked with this 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.

Note 3: The RMU-2000 ACC's Essential Performance for the purposes of EMC testing is to provide chest compressions at defined range of motion and rate. For the purposes of monitoring performance that could result in unacceptable risk during immunity/susceptibility testing the RMU-2000 ACC shall not exceed 2.4 inches.

The ISM (industrial, scientific and medical) bands between 150 kHz 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.

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 RMU-2000 ACC is used exceeds the applicable RF compliance level above, the RMU-2000 ACC should be observed to verify normal operation. If abnormal performance is observed additional measures may be necessary, such as reorienting or relocating the RMU-2000 ACC.

Separation Distances

The RMU-2000 ACC is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the RMU-2000 ACC can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the RMU-2000 ACC as recommended below, according to the maximum output of the communications equipment.

Recommended separation distances between portable and mobile RF communications equipment and the RMU-2000 ACC		
	Separation distance according to frequency of transmitter (m)	
Rated maximum output power of transmitter (W)	**150 kHz to 80 MHz 80 MHz to 800 MHz $d = 1.2\sqrt{P}$**	**800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$**
0.01	0.12	0.23
0.1	0.38	0.73
1	1.20	2.30
10	3.79	7.27
100	12.00	23.00

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: As 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: The ISM (industrial, scientific and medical) bands between 150 kHz 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.

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

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

WARNING

The use of accessories other than those specified may result in increased emissions or decreased immunity of the RMU-2000 ACC.

WARNING

Portable and mobile RF communications equipment should be used no closer to any part of the RMU-2000 ACC, including cables, than necessary.

WARNING

The RMU-2000 ACC should not be used adjacent to other electrical equipment. If the situation requires that the RMU-2000 ACC be used when adjacent with other electrical equipment, the RMU-2000 ACC should be observed to verify normal operation in the configuration in which it will be used.

The mains power quality must be that of a typical commercial or hospital environment or transportation vehicle.

10 Glossary of Symbols

10.1 Control Panel Icons

Symbol	*Meaning*
	Power ON/OFF Button • Turns the device on or off (hold button for at least one second).
	Adjust Down Button • Drives the piston down toward the patient.
	Adjust Up Button • Retracts the piston up away from the patient.
	Run Continuous Compressions Button • Performs compressions until the Pause or Off button is pressed.
	Run Compressions with Breaths Button • Performs compressions according to the compressions-with-breaths protocol and pauses for the operator to give breaths.
	Pause Button • Stops compressions when running (or resumes compressions when paused).
	Warning Indicator • Flashes and emits audible beeps to alert the user that the RMU-2000 ACC has determined that there is a problem.
	Bluetooth® ON/OFF Button • Allows the Compression Module to be wirelessly connected to an external device (e.g. a personal computer) and for RMU-2000 ACC data retrieval and event reporting when used in conjunction with utility software available at www.defibtech.com.
	Service Indicator • The Service Indicator illuminates when the RMU-2000 ACC requires servicing.
	Battery Pack Indicator • Indicates the approximate remaining Battery Pack capacity.
	Check Battery Pack Charge Button ***(on Battery Pack)*** • Checks the charge of the Battery Pack when it is not installed in the RMU-2000 ACC.

10.2 Other Symbols

Symbol	*Meaning*
	Warning or Caution, consult accompanying documents (see Chapter 2 for additional information).
	Pinch point. Keep hands and fingers clear.
	Do not expose to high heat or open flame. Do not incinerate.
	Recyclable.
	Lithium batteries.
	Consult instructions for use or consult electronic instructions for use.
	Refer to instruction manual / booklet.
	Do not damage or crush.
	Follow proper disposal procedures.
	Meets the requirements of 93/42/EEC the European Medical Device Directive (EU MDD).
IP43	Protected against solid objects over 1 mm; Protected against direct water sprays up to 60° from the vertical. Refer to IEC 60529 for further information.
IP44	Protected against solid objects over 1 mm; Protected against water sprayed from any direction. Refer to IEC 60529 for further information.
	Operational temperature limitation.
	Humidity limitation.
	Atmospheric pressure limitation.

Glossary of Symbols (continued)

Symbol	Meaning
	Manufacturer.
 YYYY-MM-DD	Date of manufacture.
	Do not reuse.
	Quantity per box.
 Rx ONLY	Federal Law (USA) restricts this device to sale by or on the order of a physician.
	Catalogue number.
	Serial number.
	Lot number.
	Keep dry.
	Keep away from sunlight.
	Handle with care.
	Not made with natural rubber latex.
	Product is not sterile.
	Defibrillation proof - Can withstand the effects of an externally applied defibrillation shock. Internally powered with defibrillator-proof BF-type patient applied parts (per EN 60601-1).
	Unique Device Identification (UDI) information.
	Battery specification.

Glossary of Symbols (continued)

Symbol	Meaning
	Use by yyyy-mm-dd.
	RBP-1000 Battery Packs that include this symbol on their label are only compatible with RMC Series Compression Modules running system software version 1.109 or greater. For more information, contact your authorized distributor or Defibtech (see Chapter 11).
	Intertek ETL certification. Conforms to AAMI ES60601-1, IEC STD 60601-1-6, IEC STD 60601-1-8, and IEC STD 60601-1-12. Certified to CSA STD C22.2# 60601-1.
MEE	Medical Electrical Equipment.
	Telecommunication and Radio Certification for Japan.
	Bluetooth® Japanese certification mark.
当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している。	This equipment contains specified radio equipment that has been certified to the Technical Regulation Conformity Certification under the Radio Law. (Japan)
24VDC ⎓	Connection point for AC Adapter. Only use the AC Adapter supplied with the Defibtech RMU-2000 ACC.
	USB Port.
	Class II equipment.
	Complies with (USA) Federal Communications Commission regulations.
	UL recognized component mark.
	Authorized European Representative.

11 Contacts

Manufacturer

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12 Warranty Information

ORIGINAL END USER'S LIMITED WARRANTY

COVERAGE
Defibtech, L.L.C. provides a LIMITED WARRANTY that the Automated Chest Compressor (ACC) (i.e., Backboard, Frame, and Compression Module) and its associated components (i.e., Battery Pack, AC Adapter, Stabilization Strap, Patient Wrist Straps, and Suction Cup), and accessories (e.g., Carrying Case, USB Cable) (collectively referred to as "Products" and singularly as "Product") whether purchased concurrently or separately, shall be substantially free from defects in material and workmanship appearing under normal service and use. To qualify for WARRANTY SERVICE, the Product must have been continuously owned by the original purchaser and the original purchaser must have purchased the Product from Defibtech or an authorized Defibtech retailer. This LIMITED WARRANTY may not be assigned or transferred.

WARRANTY PERIOD
The Products shall have a WARRANTY PERIOD of one (1) year beginning on the date of delivery. The WARRANTY PERIOD for a single use Product (e.g., Suction Cup) and Products having an expiration date shall end upon the earlier of use, expiration (if applicable), or end of the WARRANTY PERIOD. Any WARRANTY SERVICE, including but not limited to repair or replacement shall not extend a Product's WARRANTY PERIOD.

LIMITED WARRANTY SCOPE
This LIMITED WARRANTY does not cover damage of any sort resulting from, but not limited to, accidents, misuse, improper storage, improper operation, alterations, unauthorized service, tampering, abuse, neglect, fire, flood, war, or acts of God. Misuse shall include but not be limited to: use of the ACC with unapproved components; use of a Product with unapproved devices; or use of the Product in uncertified environments or settings. Defibtech does not warranty error-free or interruption-free performance of any Product.

LIMITED WARRANTY VOIDED
The LIMITED WARRANTY is immediately voided if: the Product is serviced or repaired by any entity, including persons, not authorized by Defibtech; specified Product maintenance is not performed; the Product is used with one, or more, unauthorized components or devices; or the Product is not used in accordance with Defibtech approved instructions.

WARRANTY SERVICE
At Defibtech's sole discretion, Defibtech shall have the option to repair, replace, or provide a credit. In the event of repair or replacement, Defibtech shall have the right at its sole discretion to replace the Product with a new, or refurbished, same or similar Product, and all Products or parts replaced shall become the property of Defibtech. Determination of a similar Product shall be at the sole discretion of Defibtech. In the case of replacement, the replacement at a minimum shall reflect the prorated time remaining for the Product based on the remaining WARRANTY PERIOD. In the case of a credit, the credit shall be the prorated value of the Product based on the lower of the original Product cost of the same or similar Product and the remaining WARRANTY PERIOD. Repair or replacement of a Product under this LIMITED WARRANTY does not extend the Product's WARRANTY PERIOD.

WARRANTY SERVICE (CONTINUED)
In order to obtain WARRANTY SERVICE, the original owner must contact the Defibtech authorized retailer from whom the Product was purchased, or Defibtech customer service. In the event a Product must be returned, a Defibtech issued Return Material Authorization (RMA) number is required. Products returned without a Defibtech authorized RMA number will not be accepted. The Product shall be shipped at the original end user's expense to a destination specified by the retailer or Defibtech.

OBLIGATIONS AND WARRANTY LIMITS
THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY FOR DEFIBTECH'S PRODUCTS AND IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING WITHOUT LIMITATION ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. DEFIBTECH'S MAXIMUM LIABILITY ARISING OUT OF THE SALE OF THE PRODUCT'S OR THEIR USE, WHETHER BASED UPON WARRANTY, CONTRACT, TORT OR OTHERWISE, SHALL NOT EXCEED THE ACTUAL PAYMENTS RECEIVED BY DEFIBTECH IN CONNECTION THEREWITH. DEFIBTECH SHALL NOT BE LIABLE FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL LOSS, DAMAGE OR EXPENSE (INCLUDING WITHOUT LIMITATION LOST PROFITS) DIRECTLY OR INDIRECTLY ARISING FROM THE SALE, INABILITY TO SELL, USE OR LOSS OF USE OF ANY PRODUCT (HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY), EVEN IF DEFIBTECH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSS. THE FOREGOING LIMITATION SHALL NOT APPLY TO ANY CLAIMS FOR BODILY INJURY OR DEATH TO THE EXTENT THAT LIMITATION OF DAMAGES FOR SUCH CLAIMS IS UNENFORCEABLE OR AGAINST PUBLIC POLICY UNDER ANY APPLICABLE STATUTE OR RULE OF LAW.

ANY LEGAL ACTION ARISING FROM THE PURCHASE OR USE OF A PRODUCT SHALL BE COMMENCED WITHIN ONE YEAR FROM THE ACCRUAL OF THE CAUSE OF ACTION, OR BE BARRED FOREVER. IN NO EVENT SHALL DEFIBTECH'S LIABILITY UNDER THIS WARRANTY EXCEED THE PURCHASE PRICE OF THE PRODUCT.

NO PERSON (INCLUDING ANY AGENT, DEALER, OR REPRESENTATIVE OF DEFIBTECH) IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY CONCERNING THE PRODUCTS, EXCEPT TO REFER TO THIS LIMITED WARRANTY.

If any part or term of this LIMITED WARRANTY is held to be illegal, unenforceable or in conflict with applicable law by any court of competent jurisdiction, the validity of the remaining portions of the LIMITED WARRANTY shall not be affected. The user may also have other rights that vary from state to state or country to country.