LUCAS® 3

CHEST COMPRESSION SYSTEM

Version 3.1

INSTRUCTIONS FOR USE

EN

stryker

101086-01 Rev A valid from CO J3292 © February 2023 Jolife AB

Thank you for choosing the
LUCAS® 3 Chest Compression System.

With the help of the **LUCAS® 3** device, your cardiac arrest patients will receive effective, consistent and continuous chest compressions as recommended in the American Heart Association (AHA) and European Resuscitation Council (ERC) guidelines for cardiopulmonary resuscitation.

If you have any questions about this product or its operation, please contact your local Stryker representative or the manufacturer Jolife.

This is the original master which constitutes the basic information for all translations of the Instructions for Use.

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The **LUCAS® 3** Chest Compression System is manufactured by Jolife AB, a part of Stryker, and is distributed worldwide by Stryker.

For information on local distribution, please visit www.stryker.com**.**

Localised Instruction for use can be downloaded at: www.lucas-cpr.com

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1 Important user information

The information in these Instructions for Use applies to the LUCAS® 3 Chest Compression System, version 3.1, also referred to as the LUCAS device.

All operators must read the complete Instructions for Use before operating the LUCAS Chest Compression System.

The Instructions for Use must always be easily accessible to the operators of the LUCAS device.

Always follow local and/or international guidelines for cardiopulmonary resuscitation (CPR) when you use the LUCAS Chest Compression System.

The use of other medical equipment or drugs in conjunction with the LUCAS device can affect the treatment. Always consult the Instructions for Use for the other equipment and/or drugs to make sure that they are appropriate for use in conjunction with CPR.

The LUCAS factory default settings are consistent with 2020 American Heart Association (AHA) and 2021 European Resuscitation Council (ERC) guidelines. Setup options should be changed only under the direction of a physician knowledgeable in cardiopulmonary resuscitation who is familiar with the literature in this area.

The LUCAS Chest Compression System can only be bought by or on the order of a licensed medical practitioner.

If a serious incident occurs when using the LUCAS device, report the incident to your local Stryker representative or Jolife AB, and the relevant national competent authority.

TRADEMARKS
LUCAS® is a registered trademark of Jolife AB.

DECLARATION OF CONFORMITY
LUCAS Chest Compression System complies with applicable regulatory requirements for medical devices within European Union and with the Radio Equipment Directive (RED) 2014/53/EU.

The EU Declaration of Conformity is available at www.lucas-cpr.com.

The device is marked with the CE symbol:

CE 2460

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2 Introduction

2.1 LUCAS Chest Compression System

The LUCAS Chest Compression System is a portable tool designed to overcome problems identified with manual chest compressions. The LUCAS device assists rescuers by delivering effective, consistent and continuous chest compressions as recommended in the American Heart Association guidelines[1] and the European Resuscitation Council guidelines[2].

The LUCAS Chest Compression System can be used in a wide variety of situations and settings; on the scene, during patient movement, during transportation in road and air ambulances, in hospitals and catheterisation laboratories.

2.2 Intended use

The LUCAS Chest Compression System is to be used for performing external cardiac compressions on adult patients who have acute circulatory arrest, defined as the absence of spontaneous breathing and pulse as well as loss of consciousness.

LUCAS must only be used in cases where chest compressions are likely to help the patient.

2.3 Contraindications

Do NOT use the LUCAS Chest Compression System in these cases:

- If it is not possible to position the LUCAS device safely or correctly on the patient's chest.
- Too small patient: if the LUCAS device alerts with 3 fast signals when lowering the Suction Cup and you cannot enter the PAUSE mode or ACTIVE mode.
- Too large patient: If you cannot lock the Upper Part of the LUCAS device to the Back Plate without compressing the patient's chest.

Always follow local and/or international guidelines for CPR when you use the LUCAS Chest Compression System.

2.4 Side effects

The International Liaison Committee on Resuscitation (ILCOR) states these side effects of CPR[3]:

"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 reevaluated for resuscitation-related injuries."

Apart from the above, skin abrasions, bruising and soreness of the chest are common during the use of the LUCAS Chest Compression System.

2.5 Main parts

The main parts of the LUCAS Chest Compression System include:

- A Back Plate which is positioned underneath the patient as a support for the external chest compressions.
- An Upper Part which contains the proprietary and rechargeable LUCAS Battery and the compression mechanism with the disposable Suction Cup.
- A Stabilisation Strap which helps to secure the position of the device in relation to the patient.
- A Carrying Case.

1. 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, *Circulation* 2020;142 (16_suppl 2); S337-S604
2. European Resuscitation Council Guidelines for Resuscitation 2021, *Resuscitation* 2021;161:1-432
3. 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations, *Resuscitation* 2005;67:195

2.6 Device components

1. Hood
2. User Control Panel
3. Battery
4. DC input
5. Bellows
6. Suction Cup*
7. Patient wrist strap*
8. Release ring
9. Support leg
10. Support leg strap (part of the Stabilisation Strap)
11. Neck strap* (part of the Stabilisation Strap)
12. Back Plate*
13. Claw locks
14. Car Power Cable
15. Power Supply cord
16. Power Supply
17. External Battery Charger
18. Carrying Case
19. Charger port access
20. Transparent top window
21. Upper Part
22. Pressure pad*
23. Vent holes

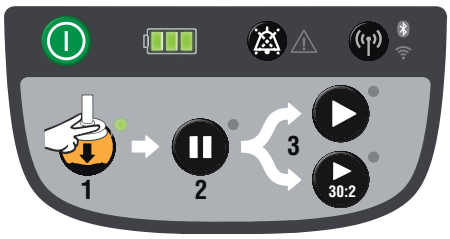
* Applied part (according to IEC 60601-1)

2.7 User Control Panel

This chapter describes the User Control Panel of the LUCAS device with factory default settings.

Your device may be set up with different settings, based on your protocols. Changing factory default settings will change the behaviour of the device.

Factory default settings and setup options are identified in chapter 9 in this document.



ON/OFF:
The LUCAS device will power up/ power down when you push this key for 1 second. When the device powers up, you will hear an audible signal sequence and the device automatically does a self-test of the functions and the protective system. When the self-test is complete the audible signal stops and a green LED (Light Emitting Diode) beside the ADJUST key illuminates. This procedure takes approximately 3 seconds.

ADJUST:
This mode is used when you want to adjust the position of the Suction Cup. When you push this key, you can manually move the Suction Cup up or down.

To set the Start Position of the Suction Cup, manually push down the Suction Cup onto the chest of the patient.

To lift up the Suction Cup from the chest, manually pull up the Suction Cup.

Setup options: The device can be set up for manual or automatic movement of the Suction Cup.

PAUSE:
When you push the PAUSE key after adjusting the Suction Cup to the patient's chest, the height position of the Suction Cup is fine-tuned and locked into the Start Position.

When you push this key during device compressions, the LUCAS device will stop compressions and lock the Suction Cup in its Start Position.

Setup options: The device can be set up for different automatic height adjustments of the Suction Cup.

ACTIVE (continuous):
When you push this key, the LUCAS device performs continuous chest compressions. The green LED signal will blink 10 times per minute to alert for ventilation during ongoing compressions.

Setup options: The device can be setup for different numbers of ventilation alerts, audible alert signal on/off, ventilation pause duration, and automatic adjustment of the Suction Cup. The rate and depth can be configured to different fixed values. The device can be configured to alter between rates by pushing the ACTIVE (continuous or 30:2) key during ongoing compressions.

ACTIVE (30:2):
When you push this key, the LUCAS device performs 30 chest compressions and then temporarily stops. During the stop, the operator can perform 2 ventilations. After the stop, the cycle starts again. An intermittent LED in combination with an audible signal sequence will alert the operator before each ventilation pause.

Setup options: The device can be setup for other compression to ventilation ratios, ventilation pause duration, and automatic adjustment of the Suction Cup. The rate and depth can be configured to different fixed values. The device can be configured to alter between rates by pushing the ACTIVE (continuous or 30:2) key during ongoing compressions.

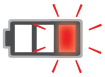
Battery indicator:
The three green LEDs show the Battery charge status:

- Three green LEDs: Fully charged

- Two green LEDs: 2/3 charged

- One green LED: 1/3 charged

- One intermittent yellow LED and alarm during operation: low battery, approximately 10 minutes of operating capacity remaining.



- One intermittent red LED and an alarm signal: the Battery is empty and must be recharged, or the Battery is too hot.

Note: When the LED to the far right is yellow and not green, the Battery has reached the end of its service life. Jolife recommends that you replace this Battery with a new one.

MUTE:
If you push this key when the LUCAS device is being operated, you will mute the alarm for 60 seconds. If you push this key when the LUCAS device is powered off, the Battery indicator shows the Battery charge status of the Battery.

High priority alarms:
One intermittent red LED and an alarm signal sequence indicate malfunction. A high priority alarm will take precedence over lower priority or information alarms.

Refer to Troubleshooting 8:
8.1 for indications and alerts during normal operation.
8.3 for malfunction alarms.

TRANSMIT data:
Push this key to send device data and receive new setup options. The device has to be in Power OFF mode to send and receive data.

For more information, please refer to Stryker data management programs, or contact your local Stryker representative.

Caution – radio frequency
Radio frequency communications can affect other medical electrical equipment.

3 Safety precautions

To ensure maximum safety, always read this section carefully before operating, carrying out any work on the equipment or making any adjustments.

3.1 Signal words

Throughout the manual, signal words are indicated with, “WARNING” or “CAUTION”.

- CAUTION – signal word used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
- WARNING – signal word used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.

3.2 Personnel

Jolife recommends that the LUCAS Chest Compression System is only used by persons with medical skills, such as: First responders, ambulance personnel, nurses, physicians or medical staff, who have:

- undertaken a CPR course according to the resuscitation guidelines, e.g. American Heart Association, European Council of Resuscitation or equivalent,
- AND received training in how to use the LUCAS device.

All operators must read the complete Instructions for Use before operating the LUCAS Chest Compression System.

3.3 Contraindications

Do NOT use the LUCAS Chest Compression System in these cases:

- If it is not possible to position the LUCAS device safely or correctly on the patient’s chest.
- Too small patient: if the LUCAS device alerts with 3 fast signals when lowering the Suction Cup and you cannot enter the PAUSE mode or ACTIVE mode.
- Too large patient: If you cannot lock the Upper Part of the LUCAS device to the Back Plate without compressing the patient’s chest.

Always follow local and/or international guidelines for CPR when you use the LUCAS Chest Compression System.

3.4 Side effects

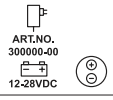
The International Liaison Committee on Resuscitation (ILCOR) states the following side effects of CPR[4]:

“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.”

The above side effects, as well as skin abrasions, bruising and soreness of the chest, are common during the use of LUCAS Chest Compression System.

4. 2005 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations. *Resuscitation* 2005;67:195

3.5 Symbols on the device

Symbol	Meaning
	Caution – keep your fingers away Do not put your hands on or below the Suction Cup when the LUCAS device operates. Keep your fingers away from the claw locks when attaching the Upper Part or lifting the patient.
	Caution – do not lift by the straps Do not use the straps for lifting. The straps are only to fixate the patient to the LUCAS device.
	Place the lower edge of the Suction Cup immediately above the end of the sternum, as indicated in the figure. The Suction Cup should be centered over the chest.
	Pull the release rings to remove the Upper Part from the Back Plate.
	Single Use Device Symbol Do not reuse - Single use only.
	**DC Input** Direct current input

Symbols on type labels

Symbol	Symbol Name and meaning
	Manufacturer Name and address
	Date of Manufacture
REF	**Catalogue Number**
LOT	**Lot (Batch) Code**
SN	**Serial Number**
MD	**European Medical Device**
	Class II equipment
	Refer to Instruction Manual/Booklet/Follow IFU All operators must read the complete Instructions for Use before operating the LUCAS Chest Compression System.
	Consult Instructions For Use/Operating Instructions
ETL CLASSIFIED Intertek 4000077 CONFORMS TO AAMI ES60601-1: 2005 /A1 : 2012 CERTIFIED TO CAN/CSA C22.2 No. 60601-1: 2014	**Electrical Safety**
	Type BF Applied Part Defibrillation protected type BF patient connection.
	Non-ionizing radiation Non-ionizing electromagnetic radiation
Voltage	V
Direct current	⎓
Alternating current	∼
Current	A
Volt ampere	VA
Hertz	Hz
Ampere hour	Ah
Watt hour	Wh

Electrical Ratings Requirements

IPXX	Mechanical (1st number)	Water (2nd number)	
IP03 (Carrying Case)	Non-protected	Water spraying from above up to ±60° from the vertical direction	**Ingress Protection Rating*** Enclosure ingress protection
IP40 (Power Supply)	1mm objects	Non-protected	
IP43 (Device)	1mm objects	Water spraying from above up to ±60° from the vertical direction	
IP44 (Battery)	1mm objects	Water splashing from any direction	

CE	**CE Mark** Includes the number of the notified body
	Safety Sign/Warning, Power Supply – Keep dry Enclosure ingress protection IP40
(01)00883873970904(17)190116(21)31180152090	**GS1 128 Barcode** Unique Device Identification with associated human readable data

	WEEE Symbol Battery and/or electronics may not be disposed in the normal waste stream.
LUCAS®	**LUCAS Logo** Device / trade name
	Australia Wireless Conformity Mark Indicates the device complies with the applicable ACMA requirements for radiocommunication
R XXX-XXXXXX	**Japan Wireless Conformity Mark** Indicates the device is certified to the applicable Japanese wireless requirements
Contains FCC ID: XXX-XXXXX-XXXX	**US (FCC) Wireless Conformity Mark** Complies with (USA) Federal Communications Commission regulations
Contains IC: XXXXXX-XXXXX	**Canada Wireless Conformity Mark** Indicates the device is certified to the applicable Canadian wireless requirements
ANATEL XXXXX-XX-XXXXX	**Brazil Wireless Conformity Mark** Indicates the device is certified to the applicable Brazilian wireless requirements
MCMC XXXXXXXXXXXX	**Malaysia Wireless Conformity Mark** Indicates the device is certified to the applicable Malaysian wireless requirements
ICASA TA XXXX-XXXX APPROVED	**South Africa Wireless Conformity Mark** Indicates the device is certified to the applicable South African wireless requirements
Complies with IMDA Standards XXXXX-XX	**Singapore Wireless Conformity Mark** Indicates the device is certified to the applicable Singaporean wireless requirements
This telecommunication equipment conforms to NTC/NBTC technical requirement	**Thailand Wireless Conformity Mark** Indicates the device is certified to the applicable Thai wireless requirements
OMAN - TRA X/XXXX/XX XXXXXXXX	**Oman Wireless Conformity Mark** Indicates the device is certified to the applicable Oman wireless requirements
TRA REGISTERED NO: XXXXXXX/XX DEALER NO: XXXXXXX/XX	**United Arab Emirates Wireless Conformity Mark** Indicates the device is certified to the applicable wireless requirements of the United Arab Emirates
TRC/LPD/XXXX/XX	**Jordan Wireless Conformity Mark** Indicates the device is certified to the applicable Jordanian wireless requirements
AGRÉÉ PAR L'ANRT MAROC Numéro d'agrément: MRXXXXX ANRT XXXX Date d'agrément: DD/MM/YYYY	**Morocco Wireless Conformity Mark** Indicates the device is certified to the applicable Moroccan wireless requirements
XXXXXXXXXXXXXXX	**Taiwan Wireless Conformity Mark** Indicates the device is certified to the applicable Taiwanese wireless requirements
www.strykeremergencycare.com/patents	**Patents information**
Rx Only	**Prescription only** US Federal Law restricts this device to use by physician or licensed practitioner
7INP6/65/96	**Battery Designation**
XXXXXX-XX REV X	**Type Label Article Number**

This table includes market-specific symbols which are included on the device labelling in relevant markets only.

3.6 General safety precautions

WARNING – USE ONLY APPROVED ACCESSORIES
Use only Jolife-approved accessories with the LUCAS Chest Compression System. The LUCAS device may not operate correctly if you use unapproved accessories. Use only LUCAS Batteries and the LUCAS Power Supply that are designed for the LUCAS device. If you use other batteries or power supply, you can cause permanent damage to the LUCAS device. This also voids the warranty.

Caution – liquid
Do not immerse the LUCAS Chest Compression System in liquid. The device can be damaged if liquid enters the hood.

WARNING – FIRE
Do not use the LUCAS Chest Compression System in oxygen rich environments or in conjunction with flammable agents or with flammable anaesthetics.

Caution – electrical device
To isolate mains from the LUCAS device, disconnect the mains plug from the mains outlet.

WARNING – OTHER MEDICAL EQUIPMENT
The LUCAS device can affect other medical electrical equipment with regards to EMC (Electromagnetic Compatibility). Take into account the technical information in section 9.9 Electromagnetic environmental declaration.

WARNING – PORTABLE RF COMMUNICATIONS EQUIPMENT
Portable RF communications equipment (including antennas and cables) should be used no closer than 30 cm (12 inches) to any part of the LUCAS device.

Caution – contamination
Clean the device between each use to reduce the risk of contamination.

3.7 Battery

WARNING – LOW BATTERY
When the yellow Battery LED shows an intermittent light, do one of these:

- Replace the Battery with one that is charged.
- Connect the external LUCAS Power Supply.

Caution – keep Battery installed
The Battery must always be installed for the LUCAS device to be able to operate, also when powered by the external Power Supply.

To minimise interruptions, we recommend always having a charged spare LUCAS Battery in the Carrying Case.

3.8 Operation

WARNING – UNSATISFACTORY POSITION
Start manual CPR again if it is not possible to position the LUCAS device safely or correctly on the patient's chest.

WARNING – INCORRECT POSITION OVER CHEST
If the pressure pad is not in the correct position in relation to the sternum, there is an increased risk of damage to the rib cage and the internal organs. In addition, the patient's blood circulation is compromised.

WARNING – INCORRECT START POSITION
The patient's blood circulation is compromised if the pressure pad presses down too heavily or too lightly on the chest. Push the ADJUST key and adjust the height of the Suction Cup immediately.

WARNING – CHANGED POSITION DURING OPERATION
If the position of the Suction Cup changes during operation or during defibrillation, immediately push ADJUST and adjust the position. Always use the LUCAS Stabilisation Strap to help secure the correct position.

Caution – defibrillation electrodes
Position the defibrillator electrodes and wires so that they are not under the Suction Cup. If there are already electrodes on the patient, make sure that they are not under the Suction Cup. If they are, you must apply new electrodes.

Caution – gel on chest
If there is gel on the patient's chest (e.g. from ultrasound examination), the position of the Suction Cup can change during use. Remove all gel before you apply the Suction Cup.

Caution – Stabilisation Strap application
Delay the application of the LUCAS Stabilisation Strap if this prevents or delays any medical treatment of the patient.

Caution – adjunctive therapies
The use of other medical equipment or drugs in conjunction with the LUCAS device can affect the treatment. Always consult the Instructions for Use for the other equipment and/or drugs to make sure that they are appropriate for use in conjunction with CPR.

WARNING – ECG interference
Chest compressions interfere with ECG analysis. Push **PAUSE** before you start the ECG analysis. Make the interruption as short as possible. Push **ACTIVE (continuous)** or **ACTIVE (30:2)** to start the compressions again.

WARNING – ELECTRICAL SHOCK
If the external Power Supply cord (optional accessory) is damaged, remove and replace it immediately to avoid the risk of electrical shock or fire.

WARNING – PATIENT INJURY
Do not let the patient or the device stay unattended when the LUCAS device operates.

Caution – keep your fingers away
Do not put your hands on or below the Suction Cup when the LUCAS device operates. Keep your fingers away from the claw locks when attaching the Upper Part or lifting the patient.

Caution – IV access
Make sure that IV access is not obstructed.

Caution – do not block the vent holes
Do not cause a blockage of the vent holes under the hood since this can cause the device to become too hot.

Caution – device alarms
If there is any malfunction during operation the red Alarm LED will illuminate and a high priority alarm will be heard.

For troubleshooting, see section 8.3.

WARNING – MALFUNCTION
If there are interruptions, or the compressions are not sufficient, or something unusual occurs during operation:
Push **ON/OFF** for 1 second to stop mechanical chest compressions and remove the device. Immediately start manual chest compressions.

Caution – do not lift by the straps
Do not use the straps for lifting. The straps are only to fixate the patient to the LUCAS device.

Caution – skin burns
The temperatures of the hood and battery may rise above 118°F/48°C. If hot, avoid prolonged contact to prevent skin burns. Remove patient hands from patient straps.

3.9 Service

We recommend a yearly servicing of the LUCAS device to make sure that it operates correctly. Use the original shipping box when you send the device for servicing. Keep the original shipping box with padding for this purpose.

WARNING – DO NOT OPEN
Never open the casing of the LUCAS device. Do not change or modify external or internal parts of the LUCAS Chest Compression System.

Unless specified differently, all servicing and repairs must be done by service personnel that are approved by Stryker or Jolife.

If the above conditions are not followed, it can lead to patient/operator injury or death and will void the warranty.

Consult your local distributor, Stryker or Jolife for current information on where to send the LUCAS device for maintenance.

4 First use preparations

4.1 Delivered items

LUCAS Chest Compression System is supplied in one box with:

- A LUCAS device (Upper Part and Back Plate)
- 2 disposable LUCAS Suction Cups
- A LUCAS Carrying Case
- Instructions for Use in the relevant language version
- A rechargeable LUCAS Battery
- A LUCAS Stabilisation Strap
- LUCAS Patient Straps

Accessories (optional):

- Disposable LUCAS Suction Cups
- External LUCAS Battery Charger
- Spare LUCAS Batteries
- LUCAS Power Supply with Mains cord
- LUCAS 12-28VDC Car Power Cable

For more accessories, please see Appendix A: LUCAS 3, Version 3.1 parts and accessories.

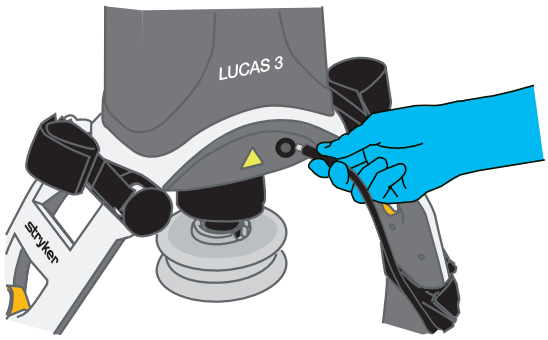
4.2 The Battery

The proprietary Lithium Polymer (LiPo) Battery is the exclusive power source for the LUCAS Chest Compression System. You can remove the Battery from the LUCAS device and recharge it. The Battery is mechanically keyed into the LUCAS device and in the Battery Charger to make sure you get the correct installation. The top of the Battery has connections for power and communications to the Battery Charger and to the LUCAS device.

4.2.1 Charge the Battery

You can charge the LUCAS Battery in two ways:

- In the LUCAS Battery Charger:
  - put the Battery in the slot of the Battery Charger,
  - connect the Battery Charger power cord to the mains wall outlet.
- Installed in the LUCAS device:
  - put the Battery in the slot of the hood of the LUCAS device,
  - connect the Power Supply to the DC input on the side of the LUCAS device,
  - connect the Power Supply to the mains wall outlet.



During charge, 3 green LEDs will show a “running” light.

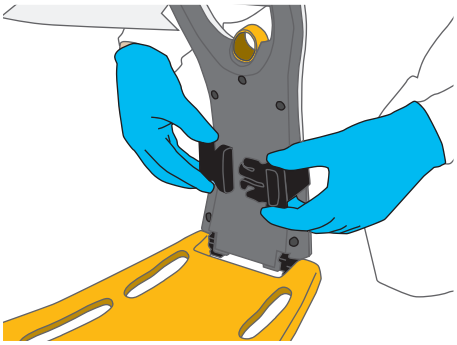
Caution – keep Battery installed
The Battery must always be installed for the LUCAS device to be able to operate, also when powered by the external Power Supply.

WARNING – USE ONLY APPROVED ACCESSORIES
Use only Jolife-approved accessories with the LUCAS Chest Compression System. The LUCAS device may not operate correctly if you use accessories that are not approved. Use only LUCAS Batteries and the LUCAS Power Supply that are designed for the LUCAS device. If you use other batteries or Power Supply you can cause permanent damage to the LUCAS device. This also voids the warranty.

4.3 Prepare the Stabilisation Strap

Before the first use of the LUCAS Chest Compression System, attach the support leg straps, which are part of the Stabilisation Strap, to the LUCAS support legs.

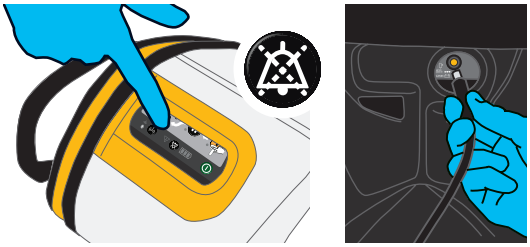
1. Fold one support leg strap around each LUCAS support leg.
2. Fasten the buckles on the inner side of the support leg.



4.4 Prepare the Carrying Case

1. Insert a fully charged LUCAS Battery in the Battery slot in the hood of the LUCAS device.
2. Make sure that a Suction Cup is mounted correctly.
3. Make sure that the patient straps and the support leg straps are attached to the Upper Part.
4. Put the Upper Part in the Carrying Case with the DC input placed downward.

   Note: Putting the LUCAS device in this position makes it possible to charge the device through the Carrying Case charger port access and to check Battery charge status through the Carrying Case top window.



5. In the Carrying Case compartment between the LUCAS support legs, you may put optional accessories such as the external Power Supply, a charged spare LUCAS Battery and extra Suction Cups.
6. Make sure the neck strap of the Stabilisation Strap is placed on top in the Carrying Case compartment and is easy to find.
7. Slide the Back Plate into the Carrying Case cover lid compartment.
8. Put the Instructions for Use in the transparent pocket.
9. Close the Carrying Case.

4.5 Optional: Change device factory default settings

The LUCAS factory default settings are consistent with 2020 American Heart Association (AHA) and 2021 European Resuscitation Council (ERC) guidelines. Setup options should be changed only under the direction of a physician knowledgeable in cardiopulmonary resuscitation who is familiar with the literature in this area.

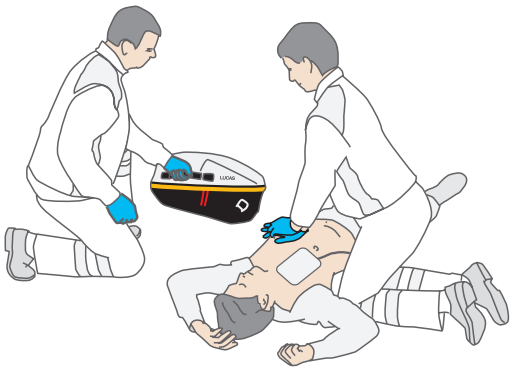
If you want to change the factory default settings, please refer to Stryker data management programs, or contact your local Stryker representative.

Factory default settings and setup options are identified in chapter 9 in this document.

5 Use the LUCAS device

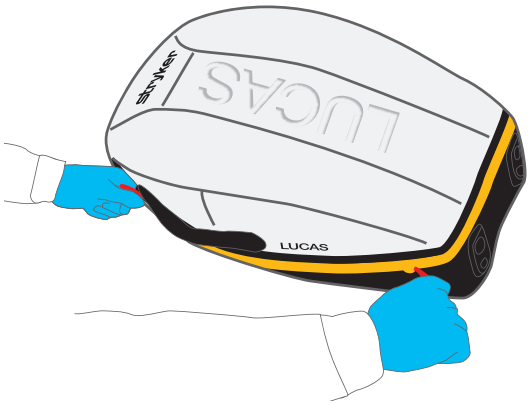
5.1 Arrival at the patient

When you have confirmed a cardiac arrest, immediately start manual cardiopulmonary resuscitation (CPR). Minimise interruptions to manual chest compressions during the preparation and application of the LUCAS Chest Compression System.



5.2 Unpack the device

1. Open the Carrying Case.



2. Push **ON/OFF** on the User Control Panel for 1 second to power up the LUCAS device and start the self test. The green LED adjacent to the **ADJUST** key illuminates when the device is ready for use.

Note: If you let the LUCAS device stay in ADJUST mode, it will power off automatically after 5 minutes.

Caution – device alarms
If there is any malfunction during operation the red Alarm LED will illuminate and a high priority alarm will be heard.
For troubleshooting, *refer to section 8.3.*

Caution – keep Battery installed
The Battery must always be installed for the LUCAS device to be able to operate, also when powered by the external Power Supply.

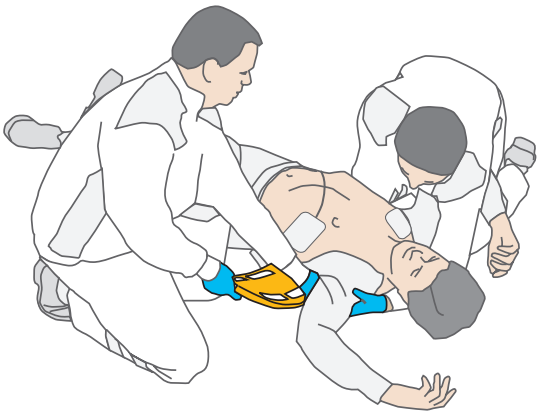
5.3 Apply to patient

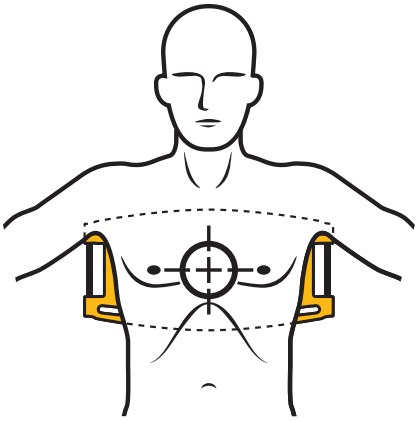
Keep interruptions to CPR to a minimum when applying the LUCAS device to the patient.

5.3.1 Place the Back Plate

1. Remove the LUCAS Back Plate from the Carrying Case.

2. Minimise interruption to manual CPR by planning for and coordinating the placement of the back plate.
   - Make sure to support the patient's head.
   - Pause manual CPR briefly while putting the LUCAS Back Plate under the patient, immediately below the arm pits. Use one of these procedures:
     a. Hold the patient's shoulder and lift the patient's upper body a small distance,
     b. Roll the patient from side to side.
3. Resume manual CPR immediately.

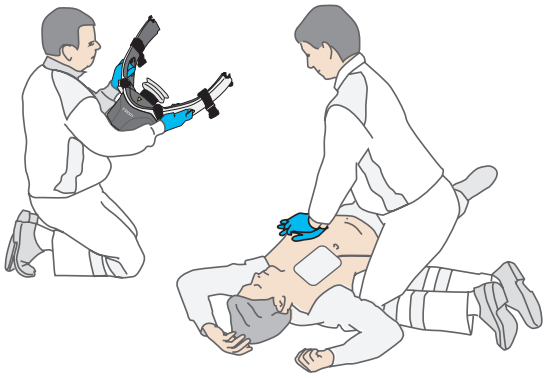


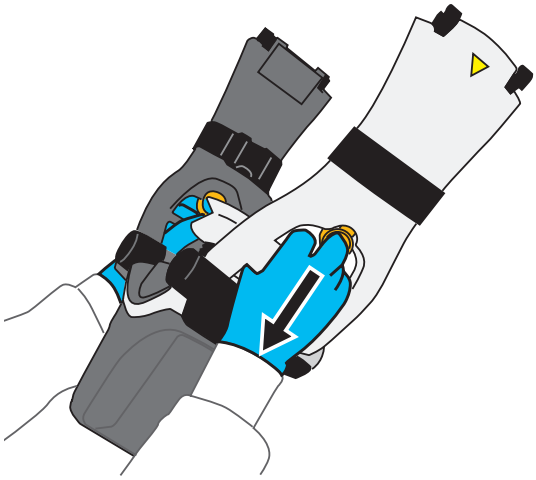


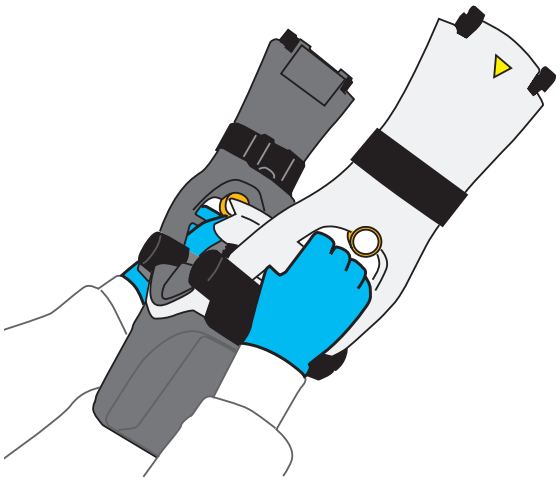
Note: An accurate position of the Back Plate makes it easier and faster to position the Suction Cup correctly.

5.3.2 Attach the Upper Part

1. Hold the handles on the support legs to remove the LUCAS Upper Part from the Carrying Case.
2. Pull the release rings once to make sure that the claw locks are open.
3. Let go of the release rings.

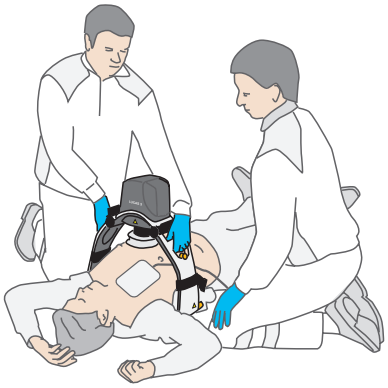






4. Minimise interruptions to manual CPR by planning and coordinating the attachment and correct positioning of the Upper Part:
   a. During ongoing manual chest compressions, attach the support leg that is nearest to you to the back plate.

   b. Stop manual CPR while attaching the other support leg to the Back Plate, so that the two support legs lock against the Back Plate.
   c. Listen for a click. Pull up once to make sure that the parts are correctly attached.



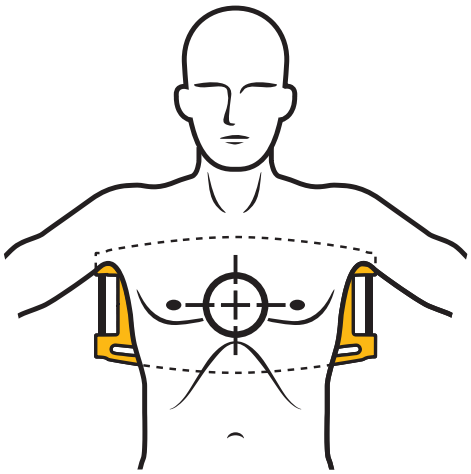
Note: If the LUCAS Upper Part does not attach to the Back Plate, make sure that the claw locks are open and that you have released the release rings.

WARNING – TOO LARGE PATIENT
If the patient is too large, the Upper Part of the LUCAS device cannot lock to the Back Plate without compressing the patient's chest. Immediately resume manual compressions.

5.4 Adjustment and operation

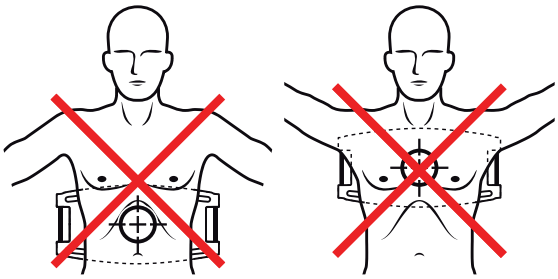
The compression point should be at the same spot as for manual CPR and according to guidelines.

When the pressure pad in the Suction Cup is in the correct position, **the lower edge of the Suction Cup is immediately above the end of the sternum.**

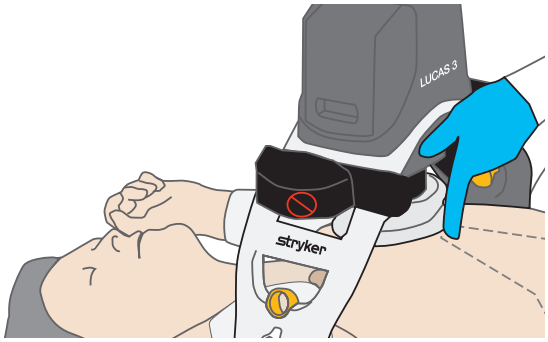


○ Suction Cup outer edge

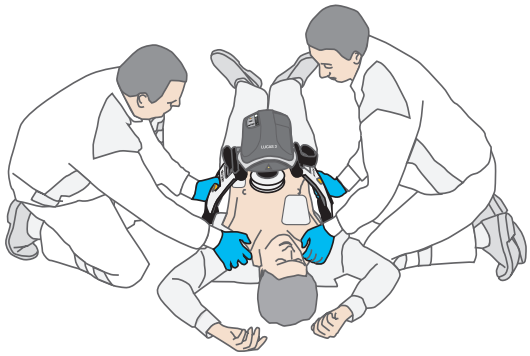
WARNING – INCORRECT POSITION OVER CHEST
If the pressure pad is not in the correct position in relation to the sternum, there is an increased risk of damage to the rib cage and the internal organs. In addition, the patient's blood circulation may be compromised.



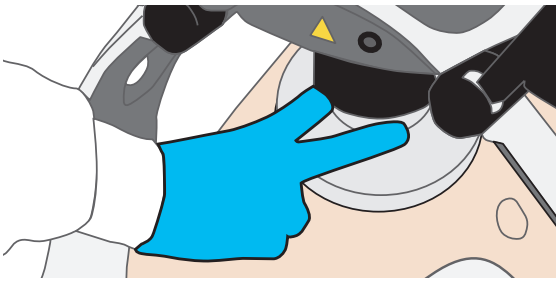
1. Use your finger to make sure that the lower edge of the Suction Cup is immediately above the end of the sternum.

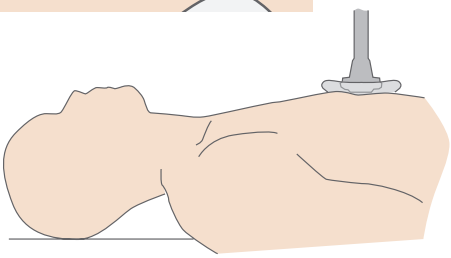


If necessary, move the device by pulling the support legs to adjust the position.

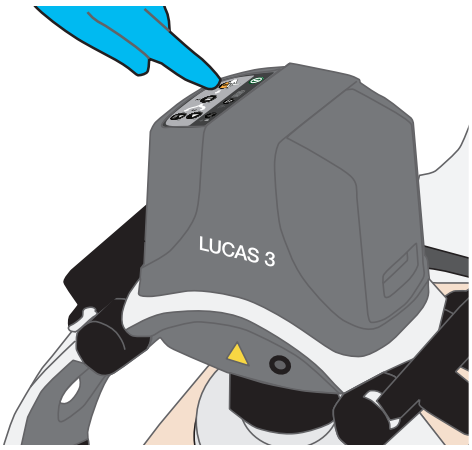


2. Adjust the height of the Suction Cup to set the Start Position.
   a. Make sure that the LUCAS device is in the **ADJUST** mode.
   b. Push the Suction Cup down until the pressure pad touches the patient's chest without compressing the chest.





c. Push **PAUSE** to lock the Start Position.



d. Check for the proper position. If not, push **ADJUST**, pull up the Suction Cup to readjust the central and/or height position for a new Start Position. Push **PAUSE**.

e. Push **ACTIVE (continuous)** OR **ACTIVE (30:2)** to start the compressions.

Note: If the Suction Cup is pushed down too hard or too loose to the chest the LUCAS device will adjust the Suction Cup to the correct Start Position.

Note: Your device may be set up with different settings based on your protocols. These settings include number of ventilation alerts, audible alert signal on/off, compression to ventilation ratio, ventilation pause duration and automatic adjustment of the Suction Cup. The rate and depth can be configured to different fixed values. The device can be configured to alter between rates by pushing the ACTIVE (continuous or 30:2) key during ongoing compressions.

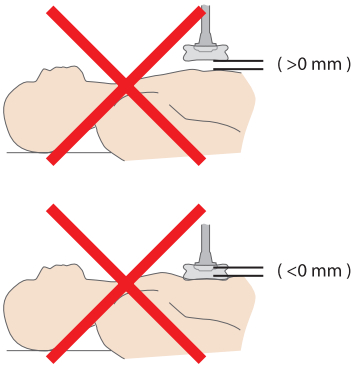
Factory default settings and setup options are identified in chapter 9 in this document.

Note: If you let the LUCAS device stay in PAUSE mode, it will power off automatically after 30 minutes.

WARNING – UNSATISFACTORY POSITION
Immediately start manual CPR again if it is not possible to position the LUCAS device safely or correctly on the patient's chest.

WARNING – TOO SMALL PATIENT
If the LUCAS device alerts with 3 fast signals when lowering the Suction Cup, and you cannot enter the PAUSE mode or ACTIVE mode. Immediately start manual compressions again.

WARNING – INCORRECT START POSITION
The patient's blood circulation may be compromised if the pressure pad presses down too heavily or too lightly on the chest. Push the ADJUST key and adjust the height of the Suction Cup immediately.



Caution – gel on chest
If there is gel on the patient's chest (e.g. from ultrasound examination), the position of the Suction Cup can change during operation. Remove all gel before you apply the Suction Cup.

Caution – keep your fingers away
Do not put your hands or other body parts on or below the Suction Cup when the LUCAS device operates. Do not touch the claw locks, especially when you lift the patient.

WARNING – PATIENT INJURY
Do not let the patient or the device stay unattended when the LUCAS device operates.

WARNING – CHANGED POSITION DURING OPERATION
If the position of the Suction Cup changes during operation or during defibrillation, immediately push **ADJUST** and adjust the position. Always use the LUCAS Stabilisation Strap to help secure the correct position.

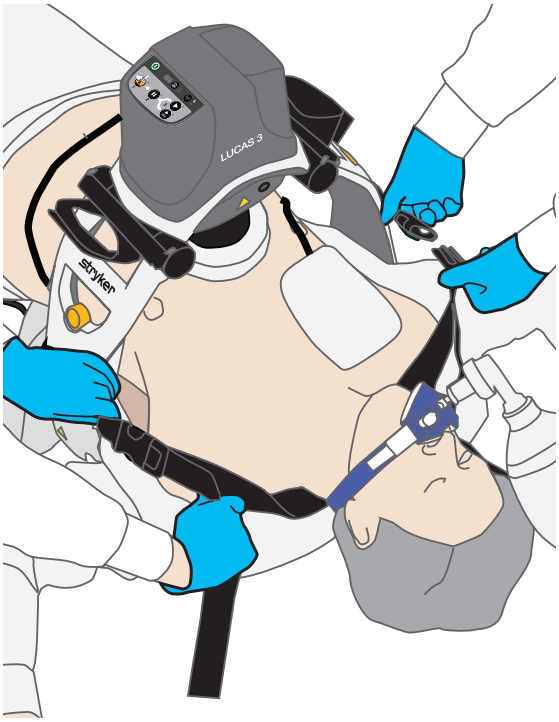
WARNING – MALFUNCTION
If there are interruptions, or the compressions are not sufficient, or something unusual occurs during operation:

Push **ON/OFF** for 1 second to stop mechanical chest compressions and remove the device. Immediately start manual chest compressions.

WARNING – LOW BATTERY
When the yellow Battery LED shows an intermittent light, do one of these:

- Replace the Battery with one that is charged.
- Connect the external LUCAS Power Supply.

Caution – do not block the vent holes
Do not cause a blockage of the vent holes under the hood since this can cause the device to become too hot.



5.5 Apply the Stabilisation Strap

The LUCAS Stabilisation Strap helps secure the correct position during operation. Apply it while the LUCAS device is active to keep interruptions to a minimum.

Caution – Stabilisation Strap application
Delay the application of the LUCAS Stabilisation Strap if this prevents or delays any medical treatment of the patient.

1. Remove the neck strap, which is a part of the Stabilisation Strap, from the Carrying Case (the support legs strap of the Stabilisation Strap should already be attached to the support legs).
2. Extend the neck strap fully at the buckles.
3. Carefully lift the patient's head and put the cushion behind the patient's neck. Position the cushion as near the patient's shoulders as possible.
4. Connect the buckles on the support leg straps with the buckles on the neck strap. Make sure that the straps are not twisted.
5. Hold the LUCAS support legs stable and tighten the neck strap tightly.
6. Make sure that the position of the Suction Cup is correct on the patient's chest.

   If it is not, adjust the position:

   a. Push **ADJUST**.

   b. Release the neck strap from the support leg straps.

   c. Adjust the Suction Cup position (as described in the section 5.4.2).

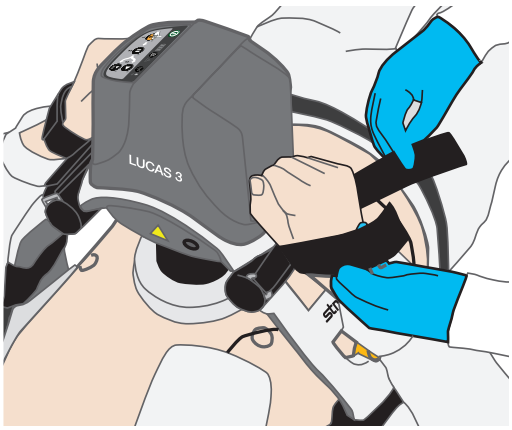
   d. When the Suction Cup is in the correct position, push **ACTIVE (continuous)** or **ACTIVE (30:2)** to start the compressions again.

   e. Attach the neck strap again. *Refer to the steps 2 to 5 above.*

5.6 Move the patient

5.6.1 Secure the patient's arms

When you move the patient, you can secure the patient's arms with the Patient Straps on the LUCAS device. This makes it easier to move the patient.



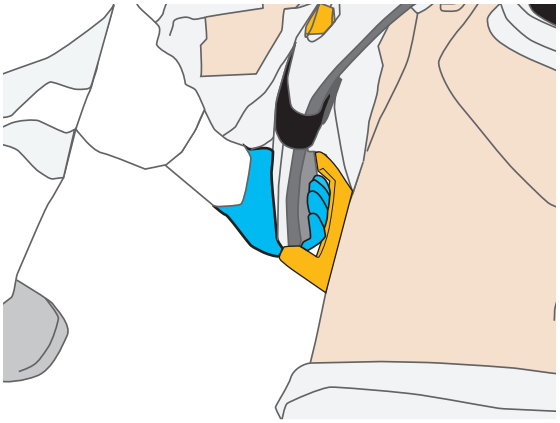
Caution – do not lift by the straps
Do not use the straps for lifting. The straps are only to fixate the patient to the LUCAS device.

Caution – IV access
Make sure that IV access is not obstructed.

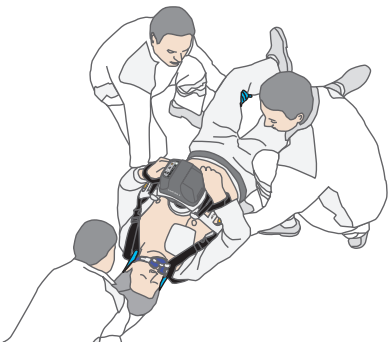
Caution – skin burns
The temperatures of the hood and battery may rise above 118°F/48°C. If hot, avoid prolonged contact to prevent skin burns. Remove patient hands from patient straps.

5.6.2 Prepare to lift the patient

1. Make a decision about what equipment you will move and where to put the transportation device.
2. Those at the patient's side:
   a. put one hand below the claw locks under the support leg



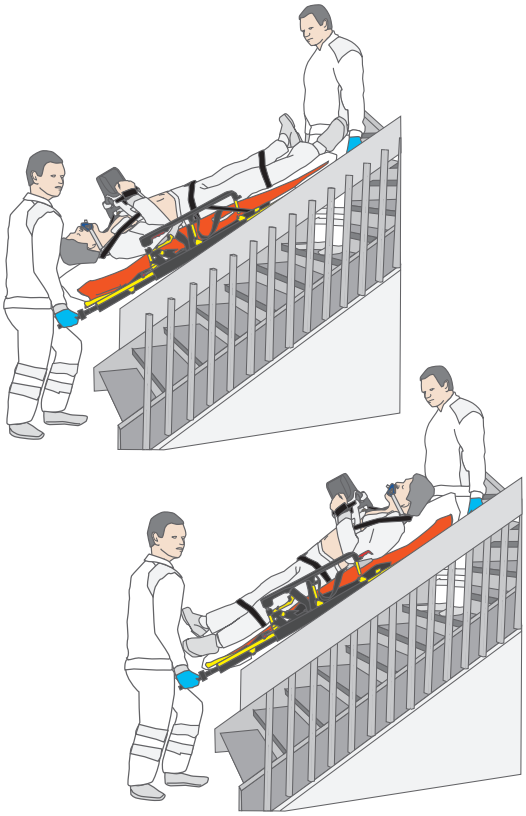
   b. with the other hand, hold the patient's belt, trousers or under the thigh
3. Make sure that the patient's head is stable.



5.6.3 Lift and move the patient

The LUCAS Chest Compression System can deliver compressions while you lift or move the patient if:

- The LUCAS device and patient are safely positioned on the transportation device.
- The LUCAS device stays in the correct position and angle on the patient's chest.



If necessary, adjust the position of the Suction Cup.

WARNING – CHANGED POSITION DURING OPERATION
If the position of the Suction Cup changes during operation or during defibrillation, immediately push **ADJUST** and adjust the position. Always use the LUCAS Stabilisation Strap to help secure the correct position.

5.7 Replace the Power Supply during operation

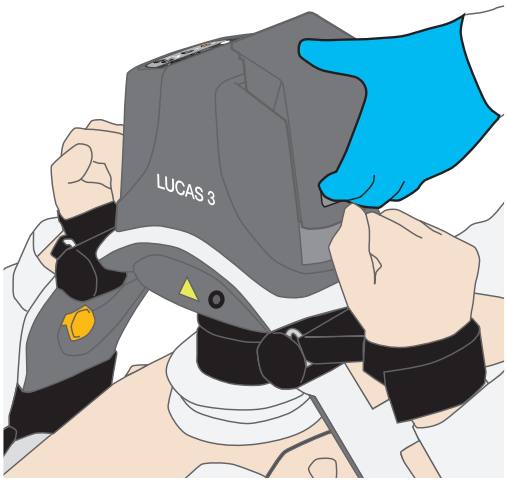
When the Battery charge is low, the LUCAS device sounds an alarm with an intermittent yellow LED and an alarm signal.

5.7.1 Change the Battery

Keep interruptions to a minimum while changing the Battery.

Note: To minimise interruptions, we recommend for you to always have a charged spare LUCAS Battery in the Carrying Case.

1. Push **PAUSE** to temporarily stop the compressions.
2. Pull the Battery out and then upwards to remove it.



3. Install a fully-charged LUCAS Battery. Put it in from above.
4. Wait until the green PAUSE mode LED illuminates.
5. Push **ACTIVE (continuous)** or **ACTIVE (30:2)** to start the chest compressions again. The LUCAS device remembers the settings and Start Position for 60 seconds.

Note: If you change the Battery in less than 60 seconds, the device remembers the Suction Cup Start Position. This allows you to quickly resume compressions by pushing ACTIVE (continuous or 30:2) key. If it takes more than 60 seconds, the device performs a self-test and you must set the Start Position again.

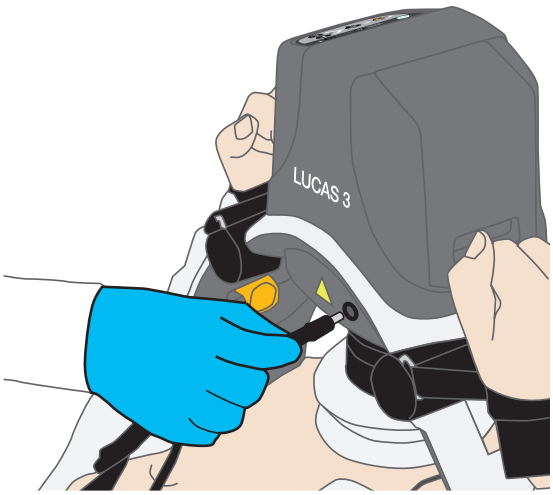
5.7.2 Connect to the external Power Supply

You can connect the LUCAS Power Supply or Car Power Cable in all operation modes of the LUCAS device.

Caution – keep Battery installed
The Battery must always be installed for the LUCAS device to be able to operate, also when powered by the external Power Supply.

To use the Power Supply cable:

- Connect the Power Supply cable to the LUCAS device.



- Connect the mains cable to the wall mains outlet (100-240V, 50/60Hz)

Note: The Power Supply may be damaged if connected to mains supply outside of above specification.

To use the Car Power Cable:

- Connect the Car Power Cable to the LUCAS device
- Connect the Car Power Cable to the car outlet (12-28VDC)

5.8 Adjunctive therapies

Caution – adjunctive therapies
The use of other medical equipment or drugs in conjunction with the LUCAS device can affect the treatment. Always consult the instructions for use for the other equipment and/or drugs to make sure that they are applicable in conjunction with CPR.

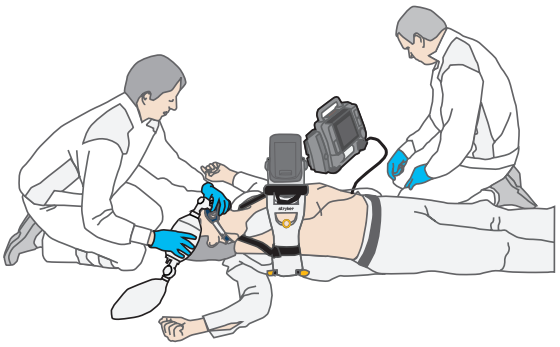
5.8.1 Defibrillation

Defibrillation can be performed while the LUCAS device operates.

- You can apply the defibrillation electrodes before or after the LUCAS device has been put in position.
- Perform the defibrillation according to the instructions from the manufacturer of the defibrillator.

Caution – defibrillation electrodes
Position the defibrillation electrodes and wires so that they are not under the Suction Cup. If there are already electrodes on the patient, make sure that they are not under the Suction Cup. If they are, you must apply new electrodes.

- After defibrillation, make sure that the position of the Suction Cup is correct. If necessary, adjust the position.



WARNING – CHANGED POSITION DURING OPERATION
If the position of the Suction Cup changes during operation or during defibrillation, immediately push **ADJUST** and adjust the position. Always use the LUCAS Stabilisation Strap to help secure the correct position.

WARNING – ECG INTERFERENCE
Chest compressions interfere with ECG analysis. Push PAUSE before you start the ECG analysis. Make the interruption as short as possible. Push **ACTIVE** (continuous) or **ACTIVE (30:2)** to start

the compressions again.

5.8.2 Ventilation

Always follow local and/or international guidelines for ventilation.

The LUCAS Chest Compression System can operate in two different modes:

- **ACTIVE (continuous)**
  When you push this key, the LUCAS device performs continuous compressions. The green LED signal will blink 10 times per minute to alert for ventilation during ongoing compressions.
- **ACTIVE (30:2)**
  When you push this key, the LUCAS device performs 30 chest compressions and then temporarily stops for the operator to provide two ventilations. After the stop, the cycle starts again. An intermittent LED in combination with an audible signal sequence alerts the operator before each ventilation pause.

Note: Your device may be set up with different settings, based on your protocols. These settings include number of ventilation alerts, audible alert signal on/off, compression to ventilation ratio, ventilation pause duration, and automatic adjustment of the Suction Cup. The rate and depth can be configured to different fixed values. The device can be configured to alter between rates by pushing the ACTIVE (continuous or 30:2) key during ongoing compressions.

Factory default settings and setup options are identified in chapter 9 in this document.

5.8.3 Use in the catheterisation laboratory

The LUCAS Chest Compression System can be used in the catheterisation laboratory. Except for the compression mechanism it is mainly radiotranslucent and allows for most X-ray projections.

5.9 Remove the device from the patient

1. Push **ON/OFF** for 1 second to power off the device.
2. If a LUCAS Stabilisation Strap is attached to the LUCAS device, remove the neck strap, which is part of the Stabilisation Strap, from the support leg straps.
3. Pull the release rings to remove the Upper Part from the Back Plate.
4. If the patient's condition allows it, remove the Back Plate.

6 Care after use and preparation for next use

6.1 Optional: Send and receive data after the event

The LUCAS Chest Compression System captures data of the device status and use, and can be configured to meet local protocols. The data can be transmitted using Bluetooth or Wi-Fi.

Push the TRANSMIT data key to send device data and receive new configurations.

To transmit:

1. Make sure the LUCAS device is powered OFF.
2. Push the TRANSMIT data key.

Caution – radio frequency
Radio frequency communications can affect other medical electrical equipment.

For more information, please refer to Stryker data management programs, or contact your local Stryker representative.

6.2 Preparation for next use

Perform the following after each use of the LUCAS Chest Compression System:

1. Remove the Suction Cup *(refer to section 6.4).*
2. If necessary, remove and clean the Patient Straps and the Stabilisation Strap separately *(refer to section 6.3 and 6.5).*
3. Clean the device and let it dry *(refer to section 6.3).*
4. Replace the used Battery with a fully charged Battery in the battery slot in the hood.
5. Mount a new Suction Cup.
6. Attach the Patient Straps again, if they are removed.
7. Attach the support leg straps of the LUCAS Stabilisation Strap again, if they are removed.
8. Pack the device into the Carrying Case:
   - Put the Upper Part in the Carrying Case with the DC input placed downward.

     Note: Putting the LUCAS device in this position makes it possible to charge the device through the Carrying Case charger access port and to check the Battery charge status through the Carrying Case top window.
   - Put the external Power Supply (optional) in the compartment between the LUCAS support legs.
   - Put a spare (optional) charged LUCAS Battery in the compartment between the LUCAS support legs.
   - Extra Suction Cups can be put in the compartment between the support legs.
   - Put the neck strap of the Stabilisation Strap between the support legs.
   - Slide the Back Plate into the Carrying Case cover lid compartment.
   - Put the Instructions for Use in the transparent pocket.
9. Close the Carrying Case.

Perform routine checks weekly and after each use *(refer to the maintenance section, chapter 7)*.

6.3 Cleaning routines

Clean all surfaces and straps with a soft cloth and warm water with a mild cleaning agent or disinfectant agent, e.g.

- 70% isopropyl alcohol solution
- 45% isopropyl alcohol with added detergent
- Quaternary ammonium compound
- 10% bleach
- Peracetic (peroxide) acid solutions

Follow the handling instructions from the manufacturer of the disinfectant.

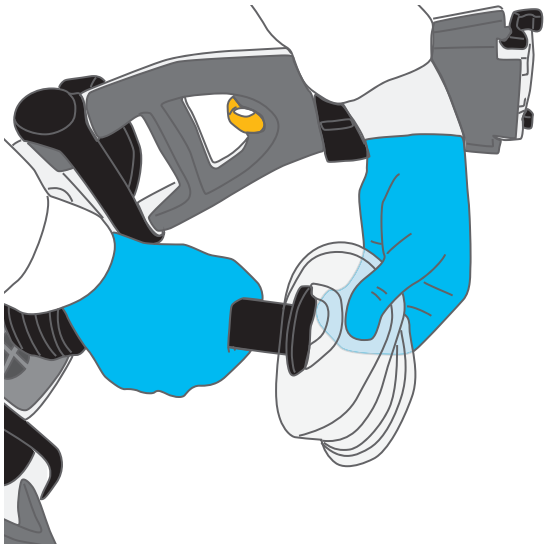
Caution – liquid
Do not immerse the LUCAS Chest Compression System in liquid. The device can be damaged if liquid enters the hood.

Allow the device to dry before you pack it into the Carrying Case.

Caution – contamination
Clean the device between each use to reduce the risk of contamination.

6.4 Remove and install the Suction Cup

- Pull the Suction Cup off the black mounting tube.
- Discard the Suction Cup as biohazardous waste.
- Bend a new Suction Cup onto the black mounting tube.
- Make sure the Suction Cup is safely attached on the mounting tube.



6.5 Remove and attach the Patient Straps

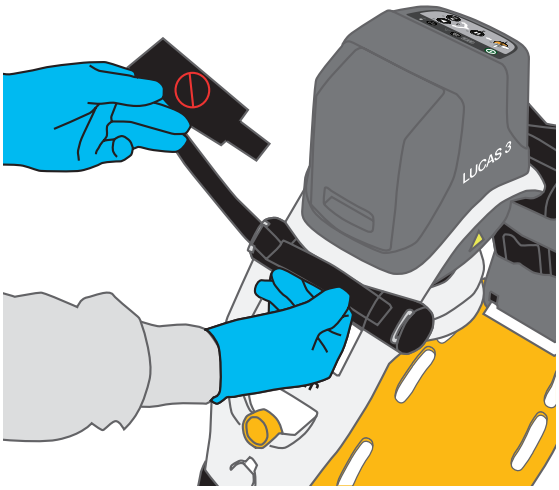
Remove:

1. Open the Patient Straps and pull them out from the metal rings on the LUCAS support legs.

Clean according to 6.3.

Install:

2. Thread the Patient Straps through the metal holder on the LUCAS support legs.
3. Fold the Patient Strap so that the symbol is visible.
4. Press the strap parts firmly together.



6.6 Remove and attach the Stabilisation Strap

Remove the Support leg straps, which are a part of the Stabilisation Strap, by opening the buckles.

Clean the Stabilisation Strap according to 6.3.

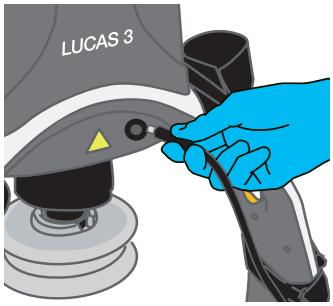
Install according to 4.3.

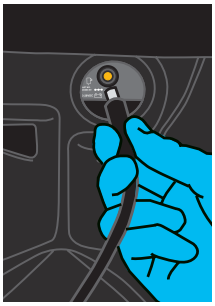
6.7 Remove and recharge the Battery

1. Replace the Battery with a fully charged one.
2. Recharge the used Battery for future use.

You can charge the LUCAS Battery in two ways:

- In the external LUCAS Battery Charger
  - put the Battery in the slot of the Battery Charger,
  - connect the Battery Charger power cord to the mains wall outlet.
- Installed in the LUCAS device:
  - put the Battery in the slot of the hood of the LUCAS device,
  - connect the Power Supply/Car Power Cable to the DC input on the side of the LUCAS device. This is possible also when the LUCAS device is inside the Carrying Case through the charger port access,
  - connect the Power Supply to the mains wall outlet.





During charge, 3 green LEDs will show a “running” light.

Caution – keep Battery installed
The Battery must always be installed for the LUCAS device to be able to operate, also when powered by the external Power Supply.

WARNING – USE ONLY APPROVED ACCESSORIES
Use only Jolife-approved accessories with the LUCAS Chest Compression System. The LUCAS device may not operate correctly if you use accessories that are not approved. Use only LUCAS Batteries and the LUCAS Power Supply that are designed for the LUCAS device. If you use other batteries or Power Supply you can cause permanent damage to the LUCAS device. This also voids the warranty.

7 Maintenance

7.1 Routine checks

Weekly, and after each use of the LUCAS Chest Compression System, perform the following:

Optional: Push TRANSMIT data key to send and receive device data. The device has to be in Power OFF mode.

Caution – radio frequency
Radio frequency communications can affect other medical electrical equipment.

1. Make sure that the device is clean.
2. Make sure that a new Suction Cup is installed.
3. Make sure that the Patient Straps are attached.
4. Make sure that the two support leg straps of the Stabilisation Strap are attached around the support legs, and that the neck strap is placed in the Carrying Case.
5. Pull the release rings upwards to make sure that the claw locks are open.
6. Make sure that the Battery is fully charged. When the LUCAS device is in the OFF mode, push **MUTE**. The Battery indicator illuminates and shows the Battery charge status *(see section 8.1).*
7. Push **ON/OFF** to make the device do a self test. Make sure the **ADJUST** LED illuminates with no alarm or warning LED.
8. Push **ON/OFF** to power off the device again.
9. Make sure that the external Power Supply cord (optional accessory) is not damaged.

WARNING – ELECTRICAL SHOCK
If the external Power Supply cord (optional accessory) is damaged, remove and replace it immediately to avoid the risk of electrical shock or fire.

8 Troubleshooting

8.1 Indications and alerts during normal operation

Refer to the table below to find the reason for sound and/or LED alarms during normal operation.

Situation	Visual LED indication	Audible signals	User action
The LUCAS device is in the ON mode and there is more than 90% Battery capacity remaining.	Fully charged Battery: All 3 green Battery indication LEDs show a constant light.	None	None
The LUCAS device is in the ON mode and there is more than 60% and less than 90% Battery capacity remaining.	2/3 charged Battery: The 2 green Battery indication LEDs to the right show a constant light.	None	None
The LUCAS device is in the ON mode and there is more than 30% and less than 60% Battery capacity remaining.	1/3 charged Battery: The green Battery indication LED farthest to the right shows a constant light.	None	None
The LUCAS device is in the ON mode and there is less than 30% Battery capacity remaining (approximately 10 minutes of operating capacity).	Low Battery: The yellow Battery indication LED farthest to the right illuminates intermittently.	Medium priority alarm ▬ ▬ ▬ (5s) ▬ ▬ ▬ (5s)...	Replace the Battery or connect to the external power supply.
An external LUCAS Power Supply is connected and charging the Battery.	Charging Battery: The 3 green Battery indication LEDs show a “running” light.	None	None
An external LUCAS Power Supply is connected and the Battery is fully charged.	Fully charged Battery: All 3 green Battery indication LEDs show a constant light.	None	None
The Battery has been used more than 200 times with compressions of more than 10 minutes each or is older than 3 to 4 years.	End of Battery service life: The Battery indication LED farthest to the right shows yellow light instead of green, in all the above situations.	None	Dispose of Battery.
In the ADJUST mode.	The ADJUST LED shows a green light.	None	None
In the PAUSE mode.	The PAUSE LED shows a green light.	None	None
Power ON	Battery LED and ADJUST LED show a green light	Self-test signals ▬ ▬ ▬ ▬	None
Power OFF	None	A “ding-dong” sound	None

Situation	Visual LED indication	Audible signals	User action
In the ACTIVE (continuous) mode	The ACTIVE (continuous) key, the LUCAS device performs continuous chest compressions. The green LED signal will blink 10 times per minute. *Optional setup: 6 to 10 times per minute*	None *Optional setup: Audible signal to prompt before each ventilation alert.* ▬	This is to alert for ventilation during ongoing compressions.
In the ACTIVE (30:2) mode	30:2 The ACTIVE (30:2) LED shows a green light with an intermittent LED during the five final compressions before each ventilation pause.	Audible signal during compressions ▬ ▬ ▬	This is to alert the operator to ventilate the patient when the device temporarily stops the compressions for ventilation.
When the Suction Cup is in a lower position than for the minimum patient (sternum height below 6.7 inches/17 cm) and you cannot enter the PAUSE mode or ACTIVE mode, the patient is too small.	None	3 fast signals ■ ■ ■ (0.25s)	Immediately start manual compressions.
Too large gap between the pressure pad and the patient's chest during operation. The patient will get too shallow compressions.	None	3 fast signals during operation ■ ■ ■ (0.6s)	Push ADJUST and readjust the Start Position to eliminate the gap. Restart the compressions.

8.2 Battery replacement

If you change the Battery in less than 60 seconds, the device remembers the Suction Cup Start Position. This allows you to quickly resume compressions by pushing ACTIVE (continuous or 30:2). If it takes more than 60 seconds, the device performs a self-test and you must set the Start Position again.

Mode when you remove the Battery	Mode when the new Battery is in place again
PAUSE	PAUSE (with the same Start Position)
ACTIVE (continuous)	PAUSE (with the same Start Position)
30:2 ACTIVE (30:2)	PAUSE (with the same Start Position)
ADJUST	ADJUST
OFF	OFF

8.3 Malfunction alarms

Below is a list of all the alarms that can occur on the LUCAS device. You mute all the alarms for 60 seconds if you push **MUTE**. To reset the below alarms the device has to be powered off by pressing the ON/OFF key for 1 second.

A high priority alarm will take precedence over lower priority or information alarms.

Start with manual compressions immediately if the LUCAS device does not operate properly.

Priority	Reason	Visual LED indication	Audible alarms	Result
N/A	Rising temperature in the LUCAS device	None	Information Signal ▬ (4s) ▬ (4s)...	None
High Priority	Compression pattern outside limit (too deep, too shallow or timing failure)	Intermittent red alarm LED	High Priority Alarm ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	Compressions stop
High Priority	Too high temperature in the LUCAS device	Intermittent red alarm LED	High Priority Alarm ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	Compressions stop
High Priority	Hardware error	Intermittent red alarm LED	High Priority Alarm ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	Compressions stop
High Priority	Too high Battery-temperature	Intermittent red alarm LED Red Battery alarm: The red Battery Indication LED farthest to the right blinks intermittently.	High Priority Alarm ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	Compressions stop
High Priority	Battery charge too low	Intermittent red alarm LED Red Battery alarm: The red Battery Indication LED farthest to the right blinks intermittently.	High Priority Alarm ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	Compressions stop. The Battery must be recharged.

If the malfunction described above seems permanent, the LUCAS device must be examined by approved service personnel. Please consult your local Stryker representative. Contact information is available at www.lucas-cpr.com.

9 Technical specifications

All specifications, factory default settings and setup options in this chapter apply to the LUCAS 3 Chest Compression System, version 3.1.

For more information, please refer to Stryker data management programs, or contact your local Stryker representative.

9.1 Patient parameters

Category	Specifications
Patients eligible for treatment:	Adult patients who fit into the device: • sternum height of 6.7 to 11.9 inches/170 to 303 mm • a maximum chest width of 17.7 inches/449 mm The use of the LUCAS device is not restricted by patient weight.

9.2 Compression parameters

Category	Specifications
Compression depth (nominal patient)	Factory default setting Patients with sternum height greater than or equal to 7.3 inches/185 mm: • 2.1 ±0.1 inches/53 ±2 mm Smaller patients with sternum height less than 7.3 inches/185 mm: • 1.5 to 2.1 ±0.1 inches/40 to 53 ±2 mm
	Setup options Compression depth can be set to a value between 1.8 and 2.1 ±0.1 inches/45 to 53 ±2 mm. Patients with sternum height greater than or equal to 7.3 inches/185 mm: • *[set compression depth]* ±0.1 inches/±2mm Smaller patients with sternum height less than 7.3 inches/185 mm: • 1.5 inches/40mm to *[set compression depth]* ±0.1 inches/±2mm
Compression frequency	Factory default setting 102 ±2 compressions per minute
	Setup options The device can be setup to provide a rate of any of the following values: 102, 111, 120 ±2 compressions per minute. The device can be setup to enable the operator to change compression rate during operation. The rate is changed by pushing the ACTIVE key (30:2 or continuous) during ongoing compressions.
Compression duty cycle	50 ±5%
Compression mode ACTIVE continuous	Factory default setting Continuous compressions with ventilation LED alert 10 times per minute
	Setup options The device can be setup to provide ventilation alerts of a value between 6 to 10 alerts per minute. The device can be setup to provide an audible ventilation alert (ON/OFF). The device can be setup to provide a ventilation pause duration of a value between 0.3 to 1.5 seconds. The device can be setup to enable the operator to change compression rate during operation. The rate is changed by pushing the ACTIVE key (continuous or 30:2) during ongoing compressions.

Category	Specifications
Compression mode ACTIVE 30:2	Factory default setting 30:2 (30 compressions followed by a 3-second ventilation pause)
	Setup options The device can be setup to provide a compression/ventilation ratio of any of the following ratios: 30:2 and 50:2. The device can be setup to provide a ventilation pause duration of a value between 3 to 5 seconds. The device can be setup to enable the operator to change compression rate during operation. The rate is changed by pushing ACTIVE key (continuous or 30:2) during ongoing compressions.
Suction Cup Start Position	Factory default setting QuickFit: The operator manually lowers the Suction Cup to the chest. When pushing the PAUSE key, coming from ADJUST mode, the LUCAS device fine-tunes the Suction Cup height position to the chest within a distance of 1.2 inches/30 mm, and then the LUCAS device locks the Start Position.
	Setup options The device can be setup for QuickFit, AutoFit or Manual. AutoFit: The device automatically lowers the Suction Cup from its upper position down to the chest and finds and locks the Start Position. The device will do the AutoFit when the operator pushes PAUSE key coming from ADJUST mode. Manual: The operator manually lowers the Suction Cup to the chest. When pushing the PAUSE key, the LUCAS device locks the Start Position. No fine-tuning will occur.
Suction Cup in ADJUST mode	Factory default setting Manual: The Suction Cup has to be pulled up manually
	Setup options The device can be setup so that the Suction Cup automatically returns up from the chest when the operator pushes the ADJUST key coming from PAUSE or ACTIVE modes.
Pressure pad in PAUSE mode	Factory default setting The device stops compressions and locks the pressure pad in its Start Position.
	Setup options To allow for chest rise during ventilation, the device can be setup so that the pressure pad moves up 0.4 inch/10 mm above the Start Position during PAUSE.
Pressure pad during ventilation pauses in ACTIVE modes	Factory default setting The device temporarily stops compressions and locks the pressure pad in its Start Position.
	Setup options To allow for chest rise during ventilation, the device can be setup so that the pressure pad moves up 0.4 inch/10 mm above the Start Position during ventilation pauses.

Category	Specifications
Pressure pad in ACTIVE modes	Factory default setting The pressure pad returns to Start Position between each compression
	Setup options To allow for chest rise during asynchronous ventilation, the device can be setup so that the pressure pad moves up 0.4 inch/10 mm above the Start Position at every compression.
Audible timers	Factory default setting No timer (OFF)
	Setup options The device can be setup to provide a recurring audible alert at a specified time interval of any value between 1 to 15 minutes. The audible alert is a short signal sequence. The timer can be setup as either CPR Timer or Continuous Timer: CPR Timer: The device only measures the time in uninterrupted ACTIVE (30:2 or continuous) modes. The CPR Timer stops and resets when the operator pushes PAUSE or ADJUST keys. The CPR Timer starts from zero again the next time the operator pushes the ACTIVE (30:2 or continuous) key. For example if CPR Timer is set for 2 minutes, the device will alert after every 2 minutes of compressions. Continuous Timer: The device measures the time continuously, independent of what mode the device is in. The Continuous Timer starts when the operator pushes the ACTIVE (30:2 or continuous) key the first time and will alert at the defined time interval until the device is powered off. For example, if Continuous Timer is set for 2 minutes, the device will alert every 2 minutes until power off.

9.3 Device physical specification

Category	Specifications
Dimensions when assembled (H×W×D)	22.0 x 20.5 x 9.4 inches/56 x 52 x 24 cm
Dimensions Carrying Case with device inside (H×W×D)	22.8 x 13.0 x 10.2 inches/58 x 33 x 26 cm
Weight of the device with the Battery (no straps)	17.7 lbs/8.0 kg
Device centre of gravity (H x W x D)	13.8 inches x symmetric x symmetric/ 35 cm x symmetric x symmetric
Expected service life	8 years

9.4 Device environmental specifications

Category	Specifications
Operating temperature	+32°F to +104°F/+0°C to +40°C - 4°F/-20°C for 1 hour after storage at room temperature
Storage temperature	-4°F to +158°F/-20°C to +70°C The maximum time required for the LUCAS device to adapt to operating temperature after storage is 2 hours.
Transient operating temperatures (minimum 20 minutes operation)	-4°F to + 122°F/-20°C to + 50°C
Relative humidity	5% to 98%, non-condensing
IP classification (IEC60529)	IP 43
Rating	Internally powered, defibrillator proof, type BF
Operating input voltage	12-28 VDC
Atmospheric pressure	62-107 kPa -1253 to 13000 ft (-382 to 4000 m)
Radio module	Bluetooth v2.1 + EDR Class 1 – up to 3 Mbps Modulation method: 8DPSK, π/4 DQPSK, GFSKFSK Operating channel: BT 2.4 GHz: Ch. 0 to 78 Frequency range: 2.4000 to 2.4835 GHz Radio frequency: Output Power (Bluetooth) Max + 10 dBm
Data transmission	The device can send device data (for example post-code data and device status) and receive new setup options. Factory default setting TRANSMIT mode: Bluetooth Optional setup - Bluetooth availability: On/Off - Wi-Fi connection to Stryker data management programs: On/Off - AutoTransmit Wi-Fi to Stryker data management programs when connected to external power supply and in Power OFF mode: On/Off
Vibration, air ambulances (IEC60601-1-12, RTCA DO-160)	Rotary wing (helicopter) – Category U2 (test curves F, F1) Fixed wing – Category S (test curves C, L, M, Y)

Recycling Information
Do not dispose of this product or its batteries in the unsorted municipal waste stream.
Dispose of this product according to local regulations.

9.5 Battery physical specifications

Category	Specifications
Size (H × W × D)	5.1 x 3.5 x 2.2 inches/13.0 × 8.8 × 5.7 cm
Weight	1.3 lbs/0.6 kg
Type	Rechargeable Lithium-ion Polymer (LiPo)
Capacity	3300 mAh (typical), 86 Wh
Battery voltage (nominal)	25.9 V
Initial Battery runtime (nominal patient)	45 minutes (typical)
Maximum Battery charge time	Charged in the LUCAS device using external Power Supply – less than two hours at room temperature (+72°F/+22°C) Charged in the external LUCAS Battery Charger – less than four hours at room temperature (+72°F/+22°C)
Battery service life (interval for recommended replacement)	Recommendation to replace the Battery every 3 to 4 years or after 200 uses (of more than 10 minutes each time). End of Battery service life will be indicated by a constant yellow LED to the far right on the Battery charge indicator.

9.6 Battery environmental specifications

Category	Specifications
Operating temperature	32°F to + 104°F/0°C to + 40°C Transient operation (20 minutes) at -4°F to + 122°F/-20°C to + 50°C
Charge temperature	+32°F to +104°F/+0°C to +40°C (+68°F to +77°F/+20°C to +25°C preferred)
Storage temperature	-4°F to +104°F/-20°C to +40°C +105°F to +158°F/+41°C to +70°C ambient for less than a month
IP classification (IEC60529)	IP44

9.7 Power specification (optional accessories)

Power Supply Art. No. 300000-00

Category	Specifications
Input	100-240VAC, 50/60Hz, 2.3A, Class II
Output	24VDC, 4.2A

Car Power Cable

Category	Specifications
Voltage/Current	12-28 VDC/0-10 A

9.8 Audible SIGNALS

9.8.1 Audible ALARM SIGNALS, characteristics

Audible signal name	Sequence of tones	Durations +/- 5ms	Tone frequency +/- 10 Hz	Sound level (dBA@1m) +/- 5dB	Situations	System delays +/-0.5s	Result
High priority alarm	▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) ▬ ▬ ▬ (...) ▬ ▬ (...) ▬ ▬ ▬ (...) ▬ ▬ (2.5s) LATCHING ALARM SIGNAL	t_d = 200ms t_s = 100ms t_{s3-4}= 400ms t_{s5-6}= 500ms t_{s8-9}= 400ms t_b = 2.5s	**f_0 = 530 Hz** f_1 = 1060 Hz f_2 = 1590 Hz f_3 = 2120 Hz f_4 = 2650 Hz	78	Self-test error during start up	1 to 10s	Inoperable device
					Compression pattern outside limit, too deep	0.6s	Compressions stop
					Compression pattern outside limit, too shallow or timing failure	30s	
					Too high temperature in device	0.6s	
					Internal hardware error	0.6s	
					Too high Battery temperature	0.6s	
					Too low Battery charge	0.6s	
Medium priority alarm	▬ ▬ ▬ (5s) ▬ ▬ ▬ (5s) ▬ ▬ ▬ (5s) ▬ ▬ ▬ (5s) NON-LATCHING ALARM SIGNAL	t_d = 200ms t_s = 200ms t_b = 5s	**f_0 = 390 Hz** f_1 = 780 Hz f_2 = 1170 Hz f_3 = 1560 Hz f_4 = 1950 Hz	75	Approximately 10 minutes remaining operating time until empty Battery Required action: Replace Battery or connect external Power Supply	0.6s	The yellow Battery indication LED farthest to the right illuminates intermittently.

NOTE: The ALARM SYSTEM also generates an independent audible ALARM SIGNAL with above stated sequence of tones by a mechanical buzzer (2400 +/- 100 Hz).

LATCHING ALARM SIGNAL = ALARM SIGNAL that continues to be generated after its triggering event no longer exists, until stopped by deliberate OPERATOR action.
NON-LATCHING ALARM SIGNAL = ALARM SIGNAL that automatically stops being generated when its associated triggering event no longer exists.

t_d = PULSE duration (electrical ON time)
t_s = PULSE spacing (electrical OFF time)
t_b = INTERBURST INTERVAL (electrical OFF time)

f_0 = fundamental frequency (first harmonic) of a PULSE

System delays = Sum of alarm signal generation delay and alarm condition delay mean (time from the occurrence of a triggering event to the generation of its alarm signal).

9.8.2 Audible INFORMATION SIGNALS, characteristics

Audible signal name	Sequence of tones	Durations +/- 5ms	Tone frequency +/- 10 Hz	Sound level (dBA@1m) +/- 5dB	Description	Situation
Power ON signal	▬ ▬ ▬ ▬ ...	t_d = 375ms t_s = 0ms	f_0 = 1 kHz	65	Continues until self-test is complete	Self-test during Power ON of the device
Power OFF signal	▬ ▬	t_d = 500ms t_s = 0ms	f_0 =660 Hz #1 f_0 =440 Hz #2	70	A “ding-dong” sound	The Suction Cup is moving to its upper position while the device is powering OFF.
Alert signals	■ ■ ■ (0.25s) ■ ■ ■ (0.25s)	t_d = 125ms t_s = 0ms t_b = 250ms	f_0 = 2 kHz	67	3 fast signals intermittently repeated	The Suction Cup is placed below the lowest Start Position (too small patient)
	■ ■ ■ (0.6s) ■ ■ ■ (0.6s)	t_d = 125ms t_s = 0ms t_b = 625ms	f_0 = 2 kHz	67	3 fast signals intermittently repeated	Gap between pressure pad and patient’s chest detected
	■ ■ ■ ■ ■ ■ ■ ...	t_d = 125ms t_s = 0ms t_b = 0ms	f_0 = 2 kHz	67	Recurrent fast signals intermittently repeated until Suction Cup is released	Suction Cup is pressed down when device is locked in PAUSE mode.
Ventilate signal in ACTIVE (30:2)	▬ ▬ ▬	t_d = 490ms t_s = 100ms	f_0 =1100 Hz #1 f_0 =1100 Hz #2 f_0 = 880 Hz #3	70	A “ding-ding-dong” sound repeated before every ventilation pause	Ventilation alert signal sequence during ACTIVE (30:2) mode before ventilation pause
Ventilate signal in ACTIVE (continuous)	▬	t_d = 490ms	f_0 =1100 Hz	70	A “ding” sound repeated to alert before every ventilation (optional setup)	Ventilation alert signal during ACTIVE (continuous) mode (optional setup)
High temperature warning	▬ (4s) ▬ (4s)	t_d = 1s t_b = 4s	f_0 = 1 kHz	65	Recurrent signals repeated until the temperature is within the normal range.	Internal temperature of device is rising.
Audible CPR or Continuous Timers	■ ■ (1s) ■ ■	t_d = 490ms t_s = 20ms t_b = 1 s	f_0 = 440 Hz f_1 = 737 Hz	70	Recurrent signal repeated according to setup (optional setup)	The Timer prompts for action (optional setup)

9.9 Electromagnetic environmental declaration

Guidance and manufacturer's declaration – electromagnetic emissions		
The LUCAS device is intended for use in the electromagnetic environment specified below. The customer or the operator of the device must make sure that it is used in the correct environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF emissions CISPR 11	Group 1	The LUCAS device uses limited radio frequency energy (Bluetooth) only during data transmission after use. This makes its radio frequency emissions low and not likely to cause interference with other electronic equipment near the LUCAS device.
RF emissions CISPR 11	Class B	The LUCAS device is suitable for use in all buildings including domestic homes and places directly connected to the public low-voltage Power Supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The LUCAS device is intended for use in the electromagnetic environment specified below. The customer or the operator of the device must make sure that it is used in the correct environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	+/- 8 kV contact +/- 2 kV, +/- 4 kV, +/- 8 kV, +/- 15 kV air	+/- 8 kV contact +/- 2 kV, +/- 4 kV, +/- 8 kV, +/- 15 kV air	Floors must be wood, concrete or ceramic tile. If there is synthetic material on the floor, the relative humidity must be 30% or more.
Electrical fast transient/Burst IEC 61000-4-4	+/- 2 kV for Power Supply lines +/- 1 kV for input/output lines	+/- 2 kV for Power Supply lines n/a. for input/output lines	The mains power quality must be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	+/- 0.5 kV, +/- 1 kV differential mode +/- 0.5 kV, +/- 1 kV, +/- 2 kV common mode	+/- 0.5 kV, +/- 1 kV differential mode n/a. for common mode	The mains power quality must be that of a typical commercial or hospital environment.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	The power frequency magnetic fields must be at levels that are characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on Power Supply input lines IEC 61000-4-11	0 % U_T (100 % dip in U_T) for 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % U_T (100 % dip in U_T) for 1 cycle 70 % U_T (30 % dip in U_T) for 0.5 sec 0 % U_T (100 % dip in U_T) for 5 sec	0 % U_T (100 % dip in U_T) for 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0 % U_T (100 % dip in U_T) for 1 cycle 70 % U_T (30 % dip in U_T) for 0.5 sec 0 % U_T (100 % dip in U_T) for 5 sec	The mains power quality must be that of a typical commercial or hospital environment. If the user of the device requires continued operation during power mains interruptions, Jolife recommends that the device is energised from a Power Supply or Battery that cannot be interrupted.
Proximity magnetic fields IEC 61000-4-39	8 A/m at 30 kHz, CW 65 A/m at 134.2 kHz, 2.1 kHz pulse modulation 7.5 A/m at 13.56 MHz, 50 kHz pulse modulation	8 A/m at 30 kHz, CW 65 A/m at 134.2 kHz, 2.1 kHz pulse modulation 7.5 A/m at 13.56 MHz, 50 kHz pulse modulation	The proximity magnetic fields must be at levels that are characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the AC mains voltage prior to the application of the test level.			

The following Essential performance was applied for EMC testing (IEC 60601-1-2: 2014 +A1:2020): The EUT shall continuously perform compression at the intended rate.

Electro Magnetic Interference (EMI)
The expected electromagnetic environments throughout the whole lifecycle of the LUCAS 3 device according to the specifications stated in IEC 60601-1-2:2014 +A1:2020 are Home Healthcare and Professional Healthcare Facility environments.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			Portable and mobile RF communications equipment must not be used nearer to the LUCAS device (cables) than the recommended separation distance calculated with the equation applicable to the frequency of the transmitter. Recommended separation distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms in ISM and amateur radio bands between 150 kHz to 80 MHz	10 Vrms 150 kHz to 80 MHz	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.7 GHz 27 V/m (380 - 390 MHz) 28 V/m (430 - 470 MHz) 9 V/m (704 - 787 MHz) 28 V/m (800 - 960 MHz) 28 V/m (1.7 - 1.99 GHz) 28 V/m (2.4 - 2.57 GHz) 9 V/m (5.1 - 5.8 GHz)	10 V/m 80 MHz to 6.0 GHz 27 V/m (380 - 390 MHz) 28 V/m (430 - 470 MHz) 9 V/m (704 - 787 MHz) 28 V/m (800 - 960 MHz) 28 V/m (1.7 - 1.99 GHz) 28 V/m (2.4 - 2.57 GHz) 9 V/m (5.1 - 5.8 GHz)	$d = 1.2\sqrt{P}$ $d = 2.3\sqrt{P}$
			where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] must be less than the compliance level in each frequency range. [b] Interference can occur near equipment marked with the following symbol.

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

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

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the LUCAS device is used exceeds the applicable RF compliance level above, the LUCAS device should be observed to make sure it operates normally. If unusual or incorrect performance is observed, additional measures can be necessary, such as reorienting or relocating the LUCAS device.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the LUCAS device

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

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter		
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	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	0.12	0.24
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

RF Output Power (tolerance ±2 dBm)					
WLAN Channel 1 – 11					
IEEE protocol	Frequency (MHz)	Modulation Type	Band Width (MHz)	Effective Radiated Power (mW)	Effective Radiated Power (dBm)
802.11b	2412 – 2462	DSSS [1]	20	50	17
802.11g	2412 – 2462	OFDM [2]	20	32	15
802.11n	2412 – 2462	OFDM [2]	20	20	13

Bluetooth channel 0–78					
Class	Frequency (MHz)	Modulation Type	Band Width (MHz)	Effective Radiated Power (mW)	Effective Radiated Power (dBm)
2	2400–2483.5	FHSS [3]	1	2.5	4

[1] DSSS – Direct-Sequence Spread Spectrum

[2] OFDM – Orthogonal Frequency Division Multiplexing

[3] FHSS – Frequency Hopping Spread Spectrum

According to the regulations in the Management of the Low Power Irradiating Electrical Machines of NCC:

Article 12 No companies, enterprises, or users are allowed to change the frequency, enhance the transmitting power or alter the original characteristics or performance of approved low power radio frequency devices without permission.

Article 14 Low power radio frequency devices shall not impact aircraft security or interfere with legal communications; if it is found that they do, the users shall cease operating them immediately until such interference is stopped.

Said legal communications refers to radio communications operated in compliance with the Telecommunications Act. The low power radio frequency devices must be susceptible to interference from irradiating devices used for communicating, industrial, scientific and medical purposes.

9.10 Limited warranty

Subject to the limitations and exclusions set forth below, Jolife AB ("Jolife") warrants that Jolife products which are purchased from authorised Jolife representatives or dealers and are used in accordance with their instructions will be free from defects in material and workmanship appearing under normal service and use for the time period listed below. The time limit and the warranty schedule begin on the date of delivery to the first purchaser.

12 Months: LUCAS 3 Chest Compression System (including the LUCAS device (Upper Part and Back Plate), Carrying Case, Battery, Stabilisation Strap, Patient Straps).

Jolife does not warrant that Jolife products will perform error-free or without interruptions. The sole and exclusive remedy under this limited warranty is to repair or replace defective material or workmanship at the option of Jolife. To qualify for the repair or replacement, the product must not have been repaired or altered in any way which, in the judgment of Jolife, affects its stability and reliability. The product must have been used and maintained in accordance with applicable operating instructions and in the intended environment or setting.

The Limited Warranty does not cover problems with products which have been caused by misuse, abuse, improper maintenance, modifications to the product or an accident. Jolife or its authorised service provider shall, at its sole discretion, determine whether a reported problem is covered under this Limited Warranty and whether the product is field serviceable. If field serviceable and located within 100 miles of a Jolife designated service location, the warranty service will be provided by Jolife or its authorised service provider at the purchaser's facility during normal business hours. If not field serviceable or if the product is located outside of such areas, all products requiring warranty service should be returned to a location designated by Jolife or its authorised service provider, freight prepaid, and must be accompanied by a written, detailed explanation of the claimed failure.

Except for the Limited Warranty provided above, NEITHER JOLIFE NOR ITS AUTHORISED SERVICE PROVIDER MAKES ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER ARISING FROM STATUTE, COMMON LAW, CUSTOMER OR OTHERWISE. THIS LIMITED WARRANTY SHALL BE THE EXCLUSIVE REMEDY AVAILABLE TO ANY PERSON OR ENTITY. NEITHER JOLIFE NOR ITS AUTHORISED SERVICE PROVIDER IS LIABLE FOR DIRECT OR INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF BUSINESS OR PROFITS) WHETHER BASED ON CONTRACT, TORT OR ANY OTHER SUPPORT LEGAL THEORY.

Any support legal action arising from the purchase or use of Jolife products shall be commenced within one year from the accrual of the cause of action, or be barred forever. In no event shall Jolife liability under this warranty or otherwise exceed the greater of $50,000 or the purchase price of the product giving rise to the cause of action.

Products are warranted in conformance with the applicable laws. 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, and all rights and obligations shall be construed and enforced as if this Limited Warranty did not contain the particular part or term held to be invalid. Some countries, and states within United States of America, do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Limited Warranty gives the user specific support legal rights. The user may also have other rights which vary from state to state or country to country.

Appendix A: LUCAS 3, Version 3.1 parts and accessories

Description
LUCAS Back Plate, slim
LUCAS Suction Cup
LUCAS Carrying Case, Hard Shell
LUCAS 3, Version 3.1 Instructions for Use (regional versions)
LUCAS Battery, Dark grey
LUCAS Stabilisation Strap
LUCAS Patient Straps
LUCAS Power Supply, Art. No.: 300 000-00 (regional versions)
LUCAS Car Power Cable 12-28VDC
LUCAS Battery Charger
LUCAS Anti Slip: Slim Back Plate
LUCAS PCI Back Plate
LUCAS Bumper Integrated Shaft Seal, Black Pair

Appendix B: Maintenance – Routine checks

Make copies of this check list to track the routine maintenance of your LUCAS device. Weekly, and after each use of the LUCAS Chest Compression System, do the following:

Date and signature

1. Make sure that the device is clean.
2. Make sure that a new Suction Cup is installed.
3. Make sure that the Patient Straps are attached.
4. Make sure that the two support leg straps of the Stabilisation Strap are attached around the support legs, and that the neck strap is placed in the Carrying Case.
5. Pull the release rings upwards to make sure that the claw locks are open.
6. Make sure that the Battery is fully charged. When the LUCAS device is in the OFF mode, push **MUTE**. The Battery indicator illuminates and shows the Battery charge status (see section 8.1).
7. Push **ON/OFF** to make the device perform a self-test. Make sure the **ADJUST** LED illuminates with no alarm or warning LED.
8. Push **ON/OFF** to power down the device again.
9. Make sure that the external Power Supply cord (optional accessory) is not damaged.

WARNING – ELECTRICAL SHOCK
If the external Power Supply cord (optional accessory) is damaged, remove and replace it immediately to avoid the risk of electrical shock or fire.

10. *Optional: push TRANSMIT key to send and receive device data. The device has to be in Power OFF mode.*

Caution – radio frequency
Radio frequency communications can affect other medical electrical equipment.

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LUCAS® 3
CHEST COMPRESSION SYSTEM

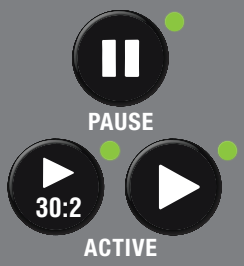
QUICK REFERENCE GUIDE

LUCAS is intended for use as an adjunct to manual CPR 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 EMS personnel are available to provide effective CPR). Refer to the Instructions For Use for complete directions for use, indications, contraindications, warnings, precautions and potential adverse events.

EN

RESCUER 1 (LUCAS Operator) **RESCUER 2**

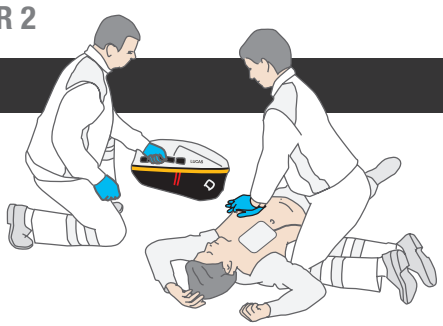
MANUAL POSITIONING OF THE SUCTION CUP



1. POWER ON LUCAS.

- Push **ON/OFF** to start self-test and power up the LUCAS device
- The device will be ready and in the **ADJUST mode**

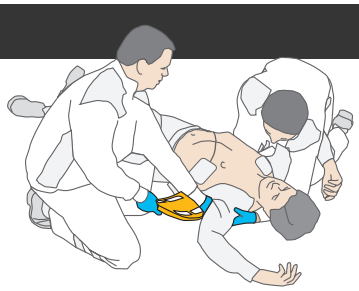
- Provide manual CPR



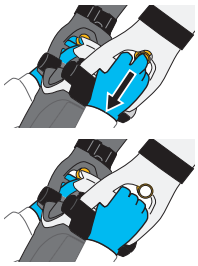
2. PLACE THE LUCAS BACK PLATE.

- Pause manual CPR briefly
- Put the **BACK PLATE** under the patient, immediately below the armpits

- Assist **BACK PLATE** placement
- Resume manual CPR

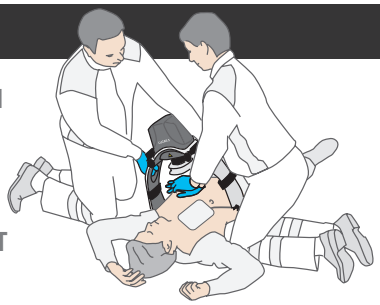


3. ATTACH THE UPPER PART.

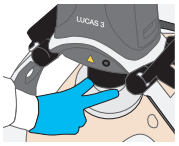


- Pull the **RELEASE RINGS** once to open **CLAW LOCKS**. Then, let go of the rings.
- Stop manual CPR briefly while attaching the **UPPER PART** to the **BACK PLATE**. Listen for a "CLICK" sound.
- Pull up once to ensure attachment

- Continue manual CPR as long as possible
- Help to attach the **UPPER PART**

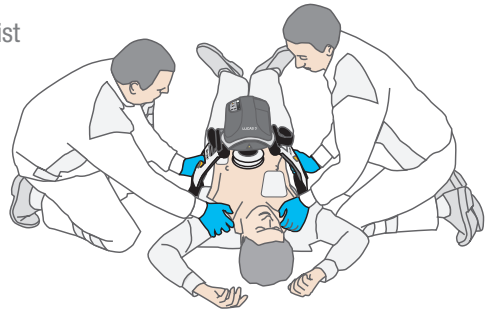


4. PUSH THE SUCTION CUP DOWN. ADJUST THE POSITION IF NEEDED.



- Push down the **SUCTION CUP**
- The lower edge of **SUCTION CUP** should be immediately above the end of the sternum
- Adjust if necessary (stay in **ADJUST mode**)

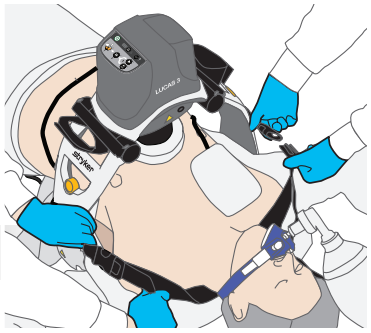
- Assist



5. LOCK POSITION. START COMPRESSIONS.

- Push **PAUSE** to lock **START POSITION**
- Push **ACTIVE (continuous)** or **ACTIVE (30:2)** to start compressions

- Assist



... ATTACH STABILISATION STRAP. FOLLOW CPR PROTOCOLS.