LUCAS®
External Cardiac Compressor
Instructions for Use
English
Important user information

All users must read this entire Instructions for Use before operating LUCAS® External Cardiac Compressor.

This Instructions for Use should always be easily accessible to the users of LUCAS®.

REQUIRED SKILLS

Jolife AB strongly recommends that LUCAS® External Cardiac Compressor only be used by: Ambulance personnel, nursing or medical staff, who have:
- undertaken a CPR course according to the European Resuscitation Council Guidelines for resuscitation, or equivalent, AND
- received training in how to use LUCAS®.

DISCLAIMER

Jolife AB assumes no responsibility for the use of LUCAS® External Cardiac Compressor by personnel that do not fulfill the requirements listed above.
Jolife AB does not accept liability for injury to personnel or damage to equipment that may result from misuse of LUCAS® External Cardiac Compressor.
Under no circumstances shall Jolife AB be liable for incidental or consequential damage arising from the use of LUCAS® External Cardiac Compressor.

TRADEMARKS

LUCAS® is a trademark of Jolife AB.
CIDEX® is a trademark of Advanced Sterilization Products.

DECLARATION OF CONFORMITY

LUCAS® External Cardiac Compressor complies with the requirements of the European Medical Device 93/42/EEC. It is marked with the CE-symbol: 0434
Table of Contents

1 INTRODUCTION ........................................................................................................4
  1.1 INTENDED USE............................................................................................4
  1.2 CONTRAINDICATIONS ....................................................................................4
  1.3 THE LUCAS® EXTERNAL CARDIAC COMPRESSOR .......................................4
  1.4 DELIVERED ITEMS........................................................................................7
  1.5 ATTACHING THE PATIENT STRAPS ............................................................7
  1.6 ATTACHING A CONNECTOR ..........................................................................7
  1.7 THE LUCAS® TEAM.....................................................................................7
  1.8 BACKGROUND ...............................................................................................8
  1.9 MECHANICAL CHEST COMPRESSION ........................................................8

2 WARNINGS AND PRECAUTIONS ..........................................................................9
  2.1 ASSEMBLY ......................................................................................................9
  2.2 USING LUCAS® EXTERNAL CARDIAC COMPRESSOR ..................................9
  2.3 CONNECTION TO GAS SUPPLY ...................................................................9
  2.4 ADJUSTING LUCAS® EXTERNAL CARDIAC COMPRESSOR TO THE PATIENT 10
  2.5 HANDLING LUCAS® EXTERNAL CARDIAC COMPRESSOR ..........................10

3 USING LUCAS® ...................................................................................................11
  3.1 ARRIVAL AT THE PATIENT ...........................................................................11
  3.2 UNPACKING AND CONNECTING THE GAS ...................................................11
  3.3 ASSEMBLY ....................................................................................................12
  3.4 ADJUSTMENT ...............................................................................................13
  3.5 OPERATING LUCAS® EXTERNAL CARDIAC COMPRESSOR ......................14
  3.6 DEFIBRILLATION ..........................................................................................14
  3.7 TRANSPORTING THE PATIENT ....................................................................15
  3.8 CHANGING GAS SOURCES ..........................................................................16

4 PACKING AWAY THE DEVICE .............................................................................17

5 CARE AFTER USE ...............................................................................................18
  5.1 CLEANING ROUTINES ................................................................................18
  5.2 ROUTINE CHECKS .......................................................................................18
  5.3 STORAGE .......................................................................................................19
  5.4 SERVICE .......................................................................................................19

6 TECHNICAL SPECIFICATION ............................................................................20
  OPERATION ..........................................................................................................20
  COMPRESSIONS ....................................................................................................20
  ENVIRONMENT .....................................................................................................20

APPENDIX A ...........................................................................................................21
  WEEKLY CHECK AND CHECK AFTER USE .........................................................21
  DISTRIBUTORS ....................................................................................................22
1 Introduction

1.1 INTENDED USE

LUCAS® External Cardiac Compressor is to be used for performing external cardiac compressions on adult patients who have acute circulatory arrest defined as absence of spontaneous breathing and pulse, and loss of consciousness.

LUCAS® can be used in cases where manual chest compression would be used. LUCAS® is only intended for temporary use.

1.2 CONTRAINDICATIONS

Do NOT use LUCAS® External Cardiac Compressor in the following cases:

- Too small adult patient: The distance between the pressure pad and the patient’s sternum exceeds 15 mm.
- Too large patient: The support legs of LUCAS® cannot be locked to the back plate without compressing the patient.
- Patient is a child.
- Pregnant patients. The woman has to lie 10-15° to one side to prevent vena cava syndrome (impaired venous return to the heart as the uterus compresses the inferior vena cava).
- If there is no indication that chest compression is likely to help the patient.

1.2.1 CONTRAINDICATION FOR USE WITH OXYGEN

- Risk of fire or sparks: If the patient or LUCAS® is in an environment where it is dangerous to use oxygen, LUCAS® must only be powered by air.

1.3 THE LUCAS® EXTERNAL CARDIAC COMPRESSOR

LUCAS® is a portable device for external cardiac compressions. It is stored and easily carried in a backpack, giving the user free hands until the device is needed.

The components of LUCAS® are shown in Figure 1 on next page.

1.3.1 DESCRIPTION

Main parts

LUCAS® consists of an upper part and a back plate. The back plate is placed underneath the patient to form a support for the external chest compressions.

The upper part contains a pneumatically driven piston rod, which acts on the patient’s chest via a pressure pad. The pressure pad is surrounded by a suction cup.

The support legs of the upper part are fastened to the back plate prior to starting compressions.

Connection to gas supply

LUCAS® can be powered by breathing oxygen or breathing air from a wall outlet in a hospital or an ambulance, or from a cylinder.

The gas hose is permanently mounted on LUCAS®, and has a unique male connector at the open end. The male connector only fits into a female connector on the separate connector hose, which must be used to connect LUCAS® to the gas supply. The connector hose is available with a range of connectors suiting different standards for gas connections.

LUCAS® requires no electrical supply and has no conducting parts on the outside, except the hose attachment, and the claw lock bar.
Figure 1. Components of LUCAS® External Cardiac Compressor.

Figure 2. Detail showing piston rod with bellows, and suction cup with pressure pad. The pressure pad is held in place by the fixating ring. Note: The flat side of the pressure pad must be directed towards the patient.
1.3.2 ON/OFF KNOB

The ON/OFF knob has three positions:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Adjust" /></td>
<td>Adjust</td>
<td>The suction cup can be adjusted to fit the patient, using the height adjustment handles.</td>
</tr>
<tr>
<td><img src="image" alt="Lock" /></td>
<td>Lock</td>
<td>The compression mechanism is locked. This is used during defibrillation and when moving the patient.</td>
</tr>
<tr>
<td><img src="image" alt="Start" /></td>
<td>Start</td>
<td>This is the operating position. When LUCAS® External Cardiac Compressor is connected to a gas supply of specified capacity, it performs compressions at a rate of about 100 per minute.</td>
</tr>
</tbody>
</table>

1.3.3 SYMBOLS ON THE DEVICE

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Location</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Attention" /></td>
<td>On the type label, inside one of the support legs.</td>
<td><strong>Attention – See instructions for use.</strong> All users must read this entire Instructions for Use before operating LUCAS® External Cardiac Compressor.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>On the hood, above the height adjustment handles.</td>
<td><strong>WARNING – Moving parts.</strong> The pressure pad and suction cup are drawn into the bellows with high force when LUCAS is connected to a gas supply. Never touch the piston rod. Keep all body parts away from the suction cup, the bellows and the height adjustment handles when connecting the gas hose, and during operation.</td>
</tr>
<tr>
<td><img src="image" alt="Caution" /></td>
<td>On the support legs, above the claw locks.</td>
<td><strong>Caution.</strong> Keep your fingers away from the claw locks when attaching the upper part to the back plate.</td>
</tr>
<tr>
<td><img src="image" alt="Place" /></td>
<td>On the back plate.</td>
<td>Place the suction cup immediately above the end of the sternum, as indicated in the figure. The suction cup should be centered over the sternum.</td>
</tr>
<tr>
<td><img src="image" alt="Pull" /></td>
<td>Under the release ring on the support legs</td>
<td>Pull up the release rings to release the support legs from the back plate.</td>
</tr>
</tbody>
</table>
1.4 DELIVERED ITEMS

LUCAS® External Cardiac Compressor is delivered in three or more boxes. Before using LUCAS®, make sure that the following items are delivered:

1. LUCAS® in carrying bag.
2. Localisation kit including Instructions for Use and patient straps, in relevant language versions.
3. Connectors as ordered.

1.5 ATTACHING THE PATIENT STRAPS

Attach the patient straps to the support legs:

1. Thread each patient strap through the two rings located at the top of each support leg.
2. Fold the patient strap so that the warning text is visible as shown in Figure 1.
3. Press the strap parts firmly together.

1.6 ATTACHING A CONNECTOR

A connector for the intended gas connection must be attached to the gas hose, before LUCAS® External Cardiac Compressor can be used:

1. When packing LUCAS®, make sure that you have got the appropriate connectors.
2. Attach the female end of the connector to the gas hose by pressing firmly until the parts have locked in place.
3. To release the connector, retract the green/yellow ring on the connector.

1.7 THE LUCAS® TEAM

It is strongly recommended that qualified personnel work in teams of two. This enables one person to perform cardiopulmonary resuscitation (CPR) while the other person unpacks LUCAS® External Cardiac Compressor.

The Instructions for Use will refer to “The LUCAS® team”, consisting of two people who have the required skills stated on page 2.

Figure 3. The LUCAS® team.

1.8 BACKGROUND

The single most common cause of death in western society is cardiovascular disease either on its own or as a contributory factor.

There is only a short space of time after the heart stops during which it is possible to reverse the situation and restore spontaneous circulation.

If the heart is not started quickly the two most important organs, the heart and brain, will be damaged by the lack of oxygen.

Effective chest compressions can restore circulation to a level, which may be sufficient to prevent heart and brain damage during a short period of time.

For optimal results the compressions should be performed in such a way that the rib cage is held down for 50% of the time, and subsequently released for the remaining 50% of the time.

However, it can be very difficult to perform manual chest compressions effectively, even for experienced CPR practitioners, and especially in a vehicle, moving ambulance, during transport or when there is no firm surface under the patient\(^2\).

### 1.9 Mechanical Chest Compression

In situations where it is possible to use a mechanical device, such as LUCAS® External Cardiac Compressor, many of the problems with manual chest compressions can be eliminated.

Mechanical chest compressors work by pressing down very quickly on the rib cage and holding it down for 50% of the period/cycle.

Mechanical chest compression should be used whenever possible because it has the following advantages over manual chest compression:

- The device maintains consistent chest compression over a long period of time.
- One person becomes free to provide other care.
- It is possible and safer for the user to give effective chest compression even in a moving vehicle.


2 Warnings and precautions

Important
This section contains safety information. All users must read this section before using LUCAS® External Cardiac Compressor and observe the safety information at all times during use.

Sections 2.1-2.5 summarize the most severe hazards during assembly and use of LUCAS® External Cardiac Compressor.

Additional hazards are described in relevant sections of the Instructions for Use. All users must observe the safety information in Warnings and Cautions during use of LUCAS® External Cardiac Compressor.

2.1 Assembly

WARNING – LETHAL PINCH HAZARD
If the gas is connected during the assembly procedure, and the ON/OFF-knob is in the “Start” position, the compressions may seriously injure the patient or create conditions leading to death of the patient.
Always follow the described sequence of gas connection and assembly.

2.2 Using LUCAS® External Cardiac Compressor

WARNING – IMPROPER USE
Improper use of the device can cause serious injury to the patient and ineffective chest compressions.

Jolife AB strongly recommends that the equipment only be used by personnel who have undertaken training in use and handling of LUCAS® External Cardiac Compressor.

Other personnel may assist those with the necessary training in using LUCAS®.

2.3 Connection to gas supply

WARNING – FIRE OR EXPLOSION HAZARD
If the patient or LUCAS® is in an environment where fire or sparks may occur, LUCAS® must not be powered by oxygen.

Always connect LUCAS® to a supply of air if there is a risk of fire or sparks.
WARNING – USING OXYGEN
Use care when operating LUCAS® together with a defibrillator.
Move flammable objects such as blankets away from the chest area and provide adequate attachment of electrodes to avoid sparks.
If LUCAS® External Cardiac Compressor is powered by oxygen in confined spaces, such as an ambulance, oxygen concentration in the confined space may rise during use.
In an ambulance, always run the ventilation at the highest capacity when using LUCAS®. Do not recirculate air.

WARNING – INTERRUPTING GAS SUPPLY TO LIFE SUPPORT DEVICES
If other life support equipment is disconnected from the gas supply, serious injury or death may result.
Never remove attachments to gas outlets without first checking that this will not put a patient at risk.

WARNING – EMPTY GAS SUPPLY
When the gas in the gas cylinder runs out, the pressure falls and compressions delivered by LUCAS® loose force.
Immediately start manual chest compressions and ensure that the gas cylinder is exchanged. Always change gas cylinder if the pressure gauge is on red.

2.4 ADJUSTING LUCAS® EXTERNAL CARDIAC COMPRESSOR TO THE PATIENT
WARNING – INCORRECT HEIGHT ADJUSTMENT
If the suction cup presses down too hard or too light on the rib cage, the patient’s circulation will be compromised.
Turn the ON/OFF knob to “Adjust” and adjust the height of the suction cup immediately.

WARNING – INCORRECT POSITION
If the suction cup is not positioned correctly in relation to the sternum, there is an increased risk of damage to the rib cage and internal organs. In addition, the patient’s circulation will be compromised.
Make sure that the suction cup is positioned according to instructions in Section 3.4 before starting compressions.
If the position changes during operation, immediately turn the ON/OFF knob to “Adjust” and adjust the position of the suction cup.

2.5 HANDLING LUCAS® EXTERNAL CARDIAC COMPRESSOR
WARNING – PINCH HAZARD
Avoid placing your hands or other body parts in the area between the suction cup and bellows.

WARNING – PINCH HAZARD
Keep your fingers away from the claw locks, particularly when lifting the patient from the floor to the stretcher with LUCAS® in position.

WARNING – POISONOUS GAS IF HEATED
The lubricant used in the pneumatic cylinder and the piston rod may form poisonous gas if heated to above 300 °C. Avoid getting the lubricant from the piston rod on your fingers. Do not smoke if you have lubricant on your fingers.
3 Using LUCAS®

This section deals with using LUCAS® External Cardiac Compressor. It is divided into eight steps:

1. Arrival at the patient
2. Unpacking and connecting the gas
3. Assembly
4. Adjustment
5. Operating
6. Defibrillation
7. Transporting the patient
8. Changing gas sources

3.1 ARRIVAL AT THE PATIENT

Upon arrival at the patient, confirm cardiac arrest by determining level of consciousness, breathing and pulse.

If the patient has suffered a cardiac arrest, commence cardio-pulmonary resuscitation (CPR) with the LUCAS® team immediately.

Figure 4. Arriving at the patient.

If CPR is already being carried out when you arrive, assist as required. It is important not to interrupt CPR.

3.2 UNPACKING AND CONNECTING THE GAS

On arrival, one of the LUCAS® team members should immediately start to unpack and connect LUCAS® External Cardiac Compressor.

3.2.1 UNPACKING LUCAS®

1. Place the bag on the floor/ground with the straps downwards and the top opposite you.

Figure 5. Opening the bag.

2. Take hold of the straps on the side of the cover and open up the cover so that the entire bag unfolds.

Figure 6. Bag opened for access to LUCAS®.
3.2.2 Connecting the Gas

**WARNING – INTERRUPTING GAS SUPPLY TO LIFE SUPPORT DEVICES**

If other life support equipment is disconnected from the gas supply, serious injury or death may result.

Never remove attachments to gas outlets without first checking that this will not put a patient at risk.

**WARNING – PINCH HAZARD**

The pressure pad and suction cup are drawn into the bellows with high force when the gas hose is connected.

Never touch the piston rod. Keep all body parts away from the suction cup, the bellows and the height adjustment handles when connecting the gas hose.

1. Confirm that the ON/OFF knob is in the Adjust position.
2. If not already connected, attach the gas hose to the connector.
3. Attach the connector to a wall outlet or to a portable gas cylinder.
   
   **Note:** Always use the outlet in the wall if there is one! If there is an outlet in the wall but it is currently in use, one can use a branch connection for two outlets.
4. If using a regulator, open the gas valve.

3.3 Assembly

**WARNING – LETHAL PINCH HAZARD**

If the gas is connected during the assembly procedure, and the ON/OFF-knob is in the “Start” position, the compressions may seriously injure the patient or create conditions leading to death of the patient.

Always follow the described sequence of gas connection and assembly.

1. Take the back plate out of the bag and approach the patient.
2. Instruct those carrying out CPR to interrupt chest compression.
3. Work in a pair, one person on each side of the patient.
4. Take hold of the patient’s arms. One of the LUCAS® team should support the patient’s head.
5. Lift up the patient’s upper body and lay the back plate below the armpits. Ensure that the patient’s arms are outside the back plate
7. Take the upper part of LUCAS® out of the bag. Lift it out by holding on to the handles of the support legs. Ensure that the support legs have reached outer position.
8. Pull up once on the release rings to check that the claw locks are open.
10. Place the upper part of LUCAS® over the patient’s chest so that the claw
locks of the support legs will engage with the back plate.

Figure 10. Attaching upper part to back plate.

11. Start by pressing on the support leg nearest to you and then the one on the other side so the support legs lock against the back plate.

12. Check by pulling upwards, that both support legs have locked against the back plate.

3.4 ADJUSTMENT

3.4.1 INTRODUCTION

To achieve effective compressions, it is very important that the suction cup is positioned correctly on the patient.

Figure 11. LUCAS® External Cardiac Compressor positioned over patient.

The lower edge of the suction cup should be immediately above the end of the sternum. The suction cup should be centered over the sternum.

Figure 12. Correct position of suction cup.

3.4.2 ADJUSTMENT PROCEDURE

WARNING – MINIMUM PATIENT SIZE

If the distance between the pressure pad and the patient’s sternum exceeds 15 mm, the patient is too small for LUCAS® to be used.

Continue manual compressions.

To adjust the position of LUCAS®:

1. Set the ON/OFF knob to Adjust.

2. Lower the suction cup with the height-adjustment handles until the pressure pad inside the suction cup touches the patient’s chest without compressing the chest.

On a small patient, it may not be possible to make the pressure pad touch the patient’s chest.

Check the distance between the pressure pad and the chest by inserting the fingers of your flattened hand between the pressure pad and the chest.

If there is more than 15 mm (height of the fingers on a flattened hand) with the pressure pad raised up inside the suction cup, LUCAS® cannot be used on the patient.

Note: By simultaneously holding up the outer rim of the suction cup you will more easily see or feel when the pressure pad touches the chest.

Figure 13. A. Suction cup compressed, ready for use. B. Too small patient, discontinue use of LUCAS®.
3. If the suction cup is not correctly positioned in relation to the patient, adjust the position of LUCAS® by pulling on the support legs. The person assembling the device determines whether the position is correct.

![Figure 14. Adjusting the position.](image)

### 3.5 OPERATING LUCAS® EXTERNAL CARDIAC COMPRESSOR

Once the pressure pad is touching the patient’s chest in the correct position, LUCAS® can be switched on:

1. Turn the **ON/OFF** knob to **Start**. LUCAS® will now give chest compressions.

**WARNING – PATIENT INJURY OR DEATH**

Do not leave the patient or device unattended while LUCAS® is active.

2. Check that the device is working as it should regarding frequency and compression.

3. When you want to stop chest compressions, turn the **ON/OFF** knob to the **Lock** position, without changing the respective positions of the patient and device.

![Figure 15. Performing defibrillation.](image)

### 3.6 DEFIBRILLATION

**WARNING – INCORRECT ECG ANALYSIS**

Compressions interfere with ECG analysis.

Switch off LUCAS® External Cardiac Compressor before ECG analysis and defibrillation.

**WARNING – INADEQUATE COMPRESSION**

Patient’s movements may change adjustment of suction cup.

Verify position of suction cup after defibrillation, re-adjust if necessary.

**Note:** Self-adhesive electrodes should be used during defibrillation as these make it easier to work with LUCAS®.

Defibrillation can be performed when LUCAS® is applied to the patient.

1. Turn the **ON/OFF** knob to **Lock**.
2. Apply electrodes and perform the defibrillation according to manufacturer’s instruction for the defibrillator.
3. After defibrillation and analysis of the outcome verify the position of the suction cup and re-adjust if necessary.
4. Start chest compressions again if required.
3.7 TRANSPORTING THE PATIENT

**WARNING – FIRE OR EXPLOSION HAZARD WHEN USING OXYGEN**

If LUCAS® External Cardiac Compressor is powered by oxygen in an ambulance, the oxygen concentration inside the ambulance may rise during transport.

Use care when operating LUCAS® together with a defibrillator.

Move flammable objects such as blankets away from the chest area and provide adequate attachment of electrodes to avoid sparks.

Always run the ventilation of the ambulance at the highest capacity when using LUCAS®. Do not recirculate air.

3.7.1 SECURING THE PATIENT’S ARMS

The patient’s arms can be fixed to the device during transport, using the straps on the support legs. This makes it easier to move the patient, especially if not in a hospital environment.

**WARNING – BLOCKED INTRAVENOUS CATHETER**

Do not tighten the patient strap/straps if drugs are administered to the patient via an intravenous catheter.

**Caution – Do not lift by the straps**

The straps are only intended for securing the patient’s arms to LUCAS®.

Apply the straps tightly enough to secure the arms, but do not overtighten as this may reduce blood circulation to the patient’s hands.

3.7.2 LIFTING THE PATIENT

At least three people should lift the patient and LUCAS® – one should support the patient’s head and there should be one person on each side.

Plan carefully before lifting the patient. Consider which equipment needs to be moved and where to place the stretcher.

Those at the side should lift with one hand beneath the claw locks of the back plate. The other hand should be used to lift the patient’s belt, trouser or under the thigh.

Use appropriate lifting technique to avoid injuries when lifting the patient.

**WARNING – PINCH HAZARD**

Do not insert your fingers in the claw locks.

Figure 16. Preparing to lift the patient.

To lift a patient:

1. Secure the patient’s arms with the straps on the support legs.
2. Turn the ON/OFF knob to Lock, to pause compressions while lifting the patient, for example when:
   - lifting to a stretcher
   - moving from one stretcher to another.
3. When the patient has been placed on the stretcher (or other surface), verify correct position of the suction cup on the patient.
4. Turn the ON/OFF knob to Start.

Once the patient is placed on the stretcher, LUCAS® may be in active state during all horizontal lifts and movements.

3.7.3 MOVING HORIZONTALLY

When the situation absolutely demands that the patient be moved while undergoing chest compression, the patient’s chest should be horizontal throughout the entire movement (see the illustration below).
3.7.4 MOVING PATIENT ON TILTED STRETCHER

In situations where conditions do not allow the chest to remain horizontal:

1. Turn the ON/OFF knob to Lock \(\uparrow\) to pause compressions.
2. As soon as the patient is in horizontal position, turn the ON/OFF knob to Start \(\downarrow\).

3.7.5 AMBULANCE TRANSPORT

Make sure that the patient is fixed when using LUCAS® External Cardiac Compres-
sor during ambulance transport. The ambulance cot should have four-point re-
straints for the patient’s upper body in addition to the two lower-body restraints.

Figure 17. Stretcher adjusted for horizon-
tal position of patient’s chest.

Figure 18. Turn off external chest compression when the patient can not be kept horizontal.

3.8 CHANGING GAS SOURCES

**WARNING – INTERRUPTED COMPRESSIONS**

Excessive changeover time if regulators have to be mounted.

Always use reserve cylinders with pre-
fitted regulators.

To change gas source:

1. Set the ON/OFF knob to Adjust \(\circ\).
2. Close the valve on the used gas cylin-
der.
3. Disconnect the gas hose from the gas source.
4. Open the valve on the new gas source.
5. Attach the gas hose to the new gas source.
6. Adjust the height of the suction cup on the patient’s chest, as described previously on page 13.
7. Turn the ON/OFF knob to Lock \(\uparrow\).
8. Turn the ON/OFF knob to Start \(\downarrow\) to continue compressions.
4 Packing away the device

To pack away LUCAS® after use:

1. Switch off the device by turning the ON/OFF knob to Adjust [3].
2. Raise the suction cup and place the height adjustment handle in its uppermost position.
3. If available, close the gas valve, and disconnect the gas hose from the gas source.
4. Disconnect the upper part of LUCAS® by placing one finger in each release ring of the handles on the support legs and pulling these up so the upper part releases from the back plate. Lay the upper part carefully on the floor.
5. If the patient’s condition allows it, remove the back plate.
6. Place the back plate in the larger pocket at the bottom of the bag.
7. Lay the upper part in the bag with the hose towards the open end.
8. Roll up the gas hose and place it on top of the device.
9. Close the bag.

Figure 19. LUCAS® packed in its bag.
5 Care after use

This section describes the routines that should be performed after each application of LUCAS® External Cardiac Compressor.

5.1 Cleaning routines

5.1.1 Normal cleaning procedure

1. Attach the upper part to the back plate.
2. Clean all outer surfaces of the device with a soft tissue, moistened in warm water with a mild cleaning agent.
3. If necessary, remove the patient straps and clean separately (see Section 1.5).
4. Remove the upper part. Clean the claw locks on the support legs and the back plate.
5. Wipe all surfaces with a clean moist tissue.

5.1.2 Disinfection

The normal cleaning procedure is sufficient after “normal” soiling. If the device is blood-stained or if an infectious patient has been treated, the device should be disinfected using either:

- 0.5% sodium hypochlorite: 1 part of liquid household bleach (5%) in 9 parts of water, or
- CIDEX® Activated Dialdehyde Solution.

1. Prepare the disinfectant solution. Note that sodium hypochlorite solution must be used immediately after preparation.
2. Moisten all surfaces of the device with the solution and leave for 10 minutes, or other time specified by manufacturer of disinfectant.
3. Wipe off with a tissue wetted in clean water. Make sure that the disinfectant is removed.
4. Place a bucket with disinfectant solution on the back plate. Lower the suction cup into the solution for 15 minutes.
5. Rinse the suction cup carefully with clean water to remove any remaining chemicals. Ensure that water does not get into the device.
6. Allow the suction cup to dry before packing LUCAS® into its bag.

5.2 Routine checks

After each use or once a week the following checks should be performed. Sign each item on the sheet attached in Appendix A:

1. Check that the device is clean.
2. Verify that the pressure pad and the fixating ring are fitted correctly as shown in Figure 2.
3. Check that the gas hose does not have any cracks and fits tightly to LUCAS®.
4. Check that the connector(s) is/are present and undamaged.

5. Check that the ON/OFF knob is in the Adjust [ ] position.

6. Pull up the release rings so that the claw locks are open for assembly. Attach the upper part to the back plate.

7. Check that the compression mechanism can be adjusted from the uppermost to the lowermost position without any jarring or sluggishness.

8. Attach the gas hose to a gas supply and switch the device on for 1-2 minutes. Check that it is operating normally. Calculate the number of compressions per minute. 100 compressions/min ± 10 is acceptable.

5.3 Storage

Store LUCAS® where it is easily accessible to all those who know how to use the device. The device should not be exposed to dirt or moisture during storage.

5.4 Service

LUCAS® should be serviced once a year to check that it is functioning properly. Use the original package, when sending LUCAS®. For this purpose, store the package and padding that came with LUCAS® when you first received it.

Under no circumstances should the LUCAS® casing be opened. There are no user-serviceable parts inside.

Contact your distributor or the manufacturer for current information on where to send LUCAS® for maintenance (see page 2 and 22 for addresses).
6 Technical specification

**OPERATION**

<table>
<thead>
<tr>
<th>Power source</th>
<th>Air or oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas consumption</td>
<td>70 litres/minute</td>
</tr>
<tr>
<td>Gas hose</td>
<td>Permanently attached, 3.3 m in length, with unique male connector. The gas hose must always be used together with a connector hose.</td>
</tr>
<tr>
<td>Connector hose</td>
<td>Hose length 0.2 m. Available with male connectors suitable for different standards of air or oxygen connections.</td>
</tr>
<tr>
<td>Approved gas sources for use with LUCAS®</td>
<td>Gas regulators or wall outlets for air or oxygen (medical grade/breathing quality) with the following specifications: Supply pressure: 4-6 bar. 1. At the peak consumption of 130 litres/minute, the supply pressure including pressure drop must not fall below 3.7 bar. 2. In addition, independent of supply pressure, the maximum allowable pressure drop at 130 litres/minute is 0.8 bar.</td>
</tr>
</tbody>
</table>

**COMPRESSIONS**

| Patients suitable for treatment | Adult patients with a sternum height of 175-265 mm who fit into the device. The device is not suitable for use with children. |
| Depth of compression | Compresses the sternum by 4 to 5 cm |
| Force of compression | 530-600 N |
| Frequency | 95-105 comp/min. at +5 °C to +25 °C (+41 °F to +77 °F) 105-110 comp/min. at +25 °C to +35 °C (+77 °F to +95 °F) 110-120 comp/min. at +35 °C to +50 °C (+95 °F to +122 °F) |

**ENVIRONMENT**

| Temperature range - operation | +5 °C to +50 °C (+41 °F to +122 °F) |
| Temperature range - storage | -30 °C to +60 °C (-22 °F to +140 °F) |
## Appendix A

### WEEKLY CHECK AND CHECK AFTER USE

Use this protocol for the weekly check on the device and the check after use. Store the completed checklist. Copying of this sheet is permitted.

<table>
<thead>
<tr>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Action</th>
<th>Approved signature</th>
<th>Adjustments carried out</th>
<th>Serious problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check that the device is clean.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify that the pressure pad and the fixating ring are fitted correctly as shown in Figure 2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check that the gas hose is not cracked and fits tightly to LUCAS®.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check that the connector(s) is/are present and undamaged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check that the <strong>ON/OFF</strong> knob is in the <strong>Adjust</strong> position.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pull the release rings so that the claw locks are open for assembly. Attach the upper part to the back plate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check that the compression mechanism can be adjusted from the uppermost to the lowermost position without any jarring or sluggishness.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attach the gas hose to a gas supply. Switch the device on for 1-2 minutes. Check that it is operating normally. Calculate the number of compressions per 60 seconds. 100 compressions/min ± 10 is acceptable.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If any error cannot be corrected take the device out of operation and indicate the problem in the ‘Serious problem’ column. Then send the device to the manufacturer for service immediately.

When carrying out these checks always use gas from a central gas supply or separate gas cylinder. Do not use up gas from a gas cylinder intended for use in emergency situations.
## Distributors

### Austria
Medtronic Österreich GmbH
Handelskai 94-96
1200 Vienna
AUSTRIA
Tel: +43 1 240 44
Fax: +43 1 240 44 100

### Belgium
Medtronic Belgium
Boechoutlaan 55
1853 Strombeek-Bever
BELGIUM
Tel: +32 2 456 09 00
Fax: +32 2 460 26 67

### Croatia
Medtronic Adriatic Region
Trg Drazena Petrovic 3/VI
10000 Zagreb
CROATIA
Tel: +385 1 334 466
Fax: +385 1 340 561

### Denmark
Medtronic-Vicare A/S
Birkered Kongevej 150B
DK-3460 Birkered
DENMARK
Tel: +45 45 82 33 66
Fax: +45 4 582 33 65

### France
Medtronic France S.A.
122, Avenue de General LeClerc
92514 Boulogne-Billancourt
Cedex Paris
FRANCE
Tel: +33 1 55 38 1700
Fax: +33 1 55 38 1800

### Germany
Medtronic GmbH
Emanuel-Leutze-Str. 20
40547 Düsseldorf
GERMANY
Tel: +49 211 529 30
Fax: +49 211 529 31 00

### Greece
Medtronic Hellas S.A.
5, Ag. Varvaras Str.
15231 Halandri, Athens
GREECE
Tel: +30 1 677 90 99
Fax: +30 1 677 93 99

### Italy
Medtronic Italia S.p.A.
Viale Fulvio Testi, 280A
20126 Milano
ITALY
Tel: +39 2 66 16 41
Fax: +39 2 642 74 88

### Netherlands
Medtronic Nederland B.V.
P.O.Box 2542
6401 OA Heerlen
THE NETHERLANDS
Tel: +31 45 566 88 00
Fax: +31 45 566 82 77

### Norway
Medtronic-Vingmed A/S
Fjordeveien 1
N-1322 HØVIK
NORWAY
Tel: +47 6 758 06 80
Fax: +47 6 710 12 12

### Portugal
Medtronic Portugal S.A.
Torres de Lisboa
Rua Tomas de Fonseca, Torre E
Floor 8, Side B
1600-209 Lisboa
PORTUGAL
Tel: +351 217 245 100
Fax: +351 217 245 199

### Spain
Medtronic Iberica S.A.
Calle Caléndula 93
28109 Madrid
SPAIN
Tel: +34 91 625 0400
Fax: +34 91 650 7410

### Sweden
Medtronic AB
Box 265
177 25 Järfalla
SWEDEN
Tel: +46 8 522 200 00
Fax: +46 8 522 200 50

### Switzerland
Medtronic Schweiz AG
Bahnhofstrasse 60
8600 Duebendorf
SWITZERLAND
Tel: +41 21 802 7000
Fax: +41 21 802 7010

### United Kingdom
Medtronic Ltd
Suite One, Sherbourne House,
Croxley Business Centre
Watford
WD18 8WW,
UNITED KINGDOM
Tel: +44 1923 212 213
Fax: +44 192 324 10 04