PHYSIO CONTROL

# LUCAS® CHEST COMPRESSION SYSTEM

## Information on Defibrillation and Ventilation with the LUCAS® Chest Compression System

The goal when using the LUCAS device is to provide effective, consistent, and uninterrupted chest compressions. When an interruption to chest compressions occurs, the patient's coronary perfusion pressure (CPP) drops rapidly. CPP is the measure of the pressure that drives blood flow through the coronary arteries to the heart muscle. The heart normally maintains a CPP of 60 millimeters of mercury (mmHg) or more. During cardiac arrest, the CPP drops dramatically, threatening the heart muscle's blood supply. As it can take some time to build up CPP again, interruptions to chest compressions should be minimized.

The current American Heart Association Guidelines emphasize minimizing interruptions when delivering high quality CPR:[1]

- Minimize pre- and post-shock pauses (class I),
- Pause compressions for less than 10 seconds when delivering two breaths (class IIa),
- Maximize the time with chest compressions (class IIb).

The European Resuscitation Council similarly emphasize the importance of minimally interrupted, high-quality compressions throughout BLS and any ALS intervention in their current Guidelines.[2]

### Defibrillation Use of the LUCAS Device

Defibrillation can be performed during LUCAS device operation. The device does not need to be stopped when delivering the shock.[3] Use the defibrillator, in manual or AED mode, according to the defibrillator manufacturer's instructions and agency protocols, and according to the recommendations below.

#### Pad Placement

Self-adhesive defibrillation pads should be used as these make it easier to work with the LUCAS device. Position the defibrillator pads and wires so they are not under the suction cup. If pads are applied after the LUCAS device is in place, orient the pads in a way so the pads and wires are not under the suction cup. If pads are already on the patient, consider applying new ones to avoid placement under the suction cup.

#### Rhythm Analysis

Pause the LUCAS device during a rhythm check with a manual defibrillator or analysis with an AED. Compressions can interfere with the ability of the rescuer or defibrillator algorithm to interpret the ECG. Make the interruption as short as possible to minimize interrupting compressions. Resume compressions as soon as feasible.

#### After Defibrillation

After the shock is delivered it is important to verify the position of the suction cup to see it has not moved out of place. This is easier to do if an ink marker line was marked where the suction cup was originally positioned on the patient. Readjust as necessary.

### Oxygenation with Ventilation

To supply adequate concentrations of oxygen in the blood, ensure the patient is properly ventilated. Ventilations should be provided in conjunction with mechanical chest compressions. Interruptions to chest compressions should be minimized to maintain the level of oxygen delivered to tissues. During the first few minutes of sudden cardiac arrest, chest compressions to improve blood flow have been shown to be more important than ventilations because oxygen blood levels remain high initially.[4]

The optimal method of managing the airway during cardiac arrest will vary depending on the provider experience, emergency medical services (EMS) or healthcare system characteristics, and the patient's condition.

#### Non-secured Airway (e.g., bag-valve-mask):

Stop chest compressions during delivery of ventilations. The AHA and ERC Guidelines recommend a compression/ventilation ratio of 30:2, providing rescue breaths over 1 second each, with enough volume to produce visible chest rise.[5,6]

- Press **ACTIVE (30:2)** and the LUCAS device will perform 30 compressions and then temporarily stop for 3 seconds to allow for two ventilations to take place. An intermittent LED in combination with an audio signal sequence will alert the operator before each ventilation pause.

#### Secured airway (e.g., endotracheal tube):

Ventilation and chest compressions do not need to be synchronized and ventilations can be provided without pausing for compressions. The AHA and ERC Guidelines recommend 10 ventilations per minute and limited tidal volume to achieve chest rise.* Avoid rapid or forceful breaths to prevent potential barotrauma.[5,6] Follow your protocols regarding ventilations for patients with a secured airway in place.

- Press **ACTIVE (continuous)** to provide continuous compressions. A green LED blinks 8 times per minute to alert the rescuer for ventilation.

**Note: The change of ventilation rate from 8-10 breaths/min to 10 breaths/min was to simplify 2015 Guidelines, not due to any new scientific evidence. ILCOR consensus on science endorses the range of 6-10 breaths/min.[7]*

### Alternative airways

Airways like Laryngeal Mask Airways (e.g., LMA™), LMA ProSeal™, Laryngeal Tube from VBM Medical, esophageal-tracheal tube (e.g., Combitube™) require caution during use with mechanical compressions due to limited clinical data. If gas leakage causes inadequate ventilation of the patient's lungs during continuous compressions, pause compressions to enable ventilation in the same way as for non-secured airways (switch to 30:2).[8]

### Mechanical ventilators

Most mechanical ventilators have not been designed to manage the great variations in pressure that occur in the thorax during external chest compressions. Take caution if using mechanical ventilators together with manual as well as mechanical CPR.

### Impedance threshold devices (e.g., ResQPOD®)

Experimental data suggest that the Impedance Threshold Device (ITD) is compatible for use with LUCAS chest compressions.[9] Refer to the ITD manufacturer's instructions for use, indications, contraindications, warnings, precautions and potential adverse events.

### General precaution

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.

#### References


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4. Kern K, Hilwig R, Berg R, et al. Importance of continuous chest compressions during cardiopulmonary resuscitation: improved outcome during a simulated single lay-rescuer scenario. *Circulation.* 2002.105:645–649.
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7. Callaway C, Soar J, Aibiki M, et al. 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations, Part 4: Advanced Life Support, *Resuscitation.* 2015; 95:e80:S84–S145.
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9. Matsuura T, McKnite S, Metzger A, et al. "An impedance threshold compression-decompression CPR device (LUCAS) improves chances for survival in pigs in cardiac arrest". *Circulation.* 2008.118:S1449-S1450.


**NOTE:** Refer to the Instructions for Use for complete device information including directions for use, intended use and warnings. Always follow local and/or international guidelines for cardiopulmonary resuscitation (CPR) when you use the LUCAS chest compression system.

**For further information, please contact Physio-Control at 800.442.1142 (U.S.), 800.895.5896 (Canada) or visit our website at www.physio-control.com**


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