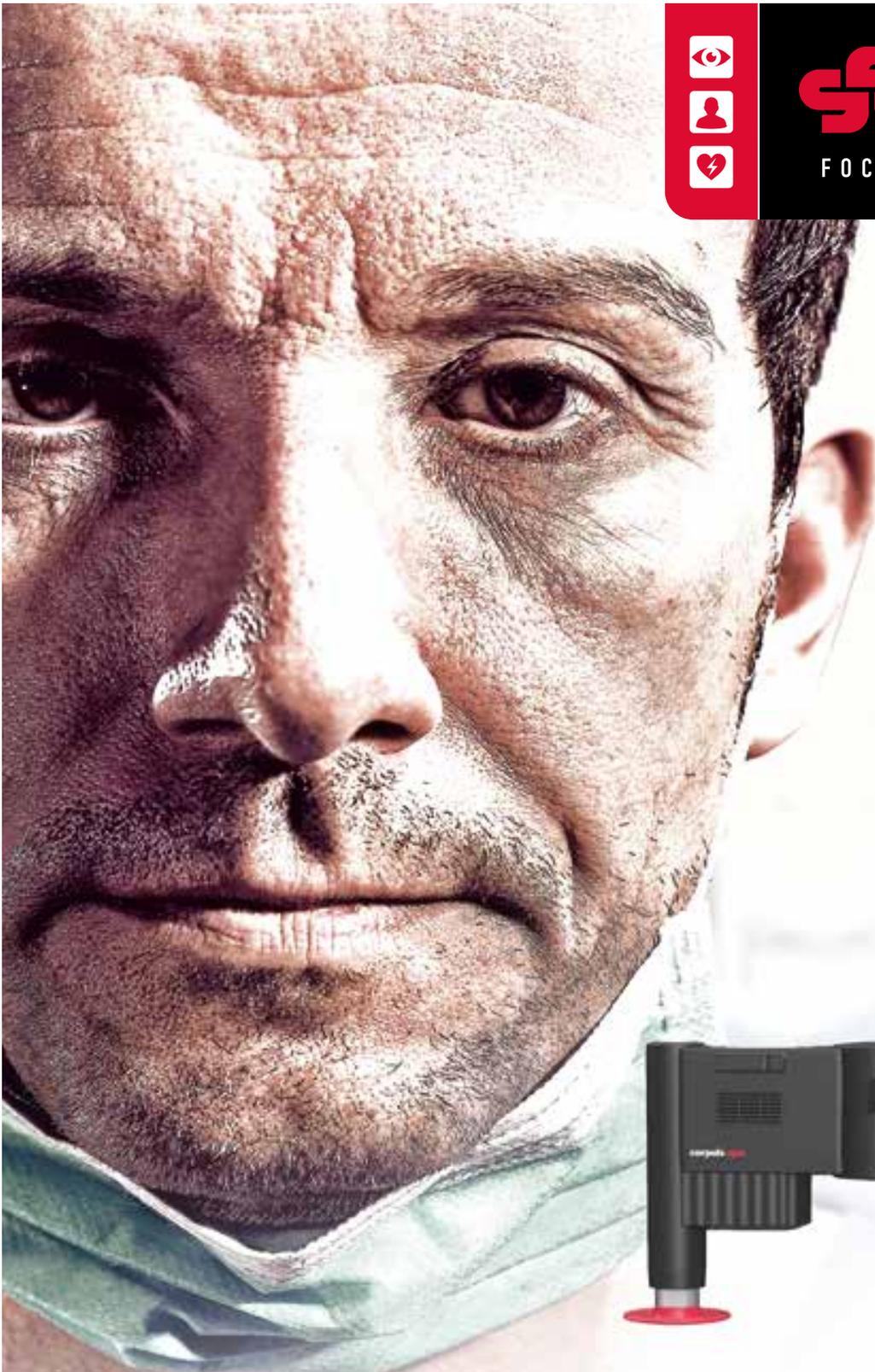




**corpuls®**

FOCUS - ON - PATIENTS

**I AM  
NO  
HERO**  
IT'S MY JOB



**corpuls cpr**



# LONG ARM SAVES LIVES

Possibly the most modern and innovative mechanical chest compression devices, easy and extremely intuitive user guidance, support users in Emergency Medical Services professionals in hospitals when working on

the **corpuls cpr** arm with an inserted hand – depending on requirements – and resuscitation boards available: Scoopboard. These were specially designed requirements in EMS, air rescue they are made of radiolucent material.

## FEATURES

- corpuls cpr** offers professional users **access** to the patient's thorax.
- treatment can thus be initiated while resuscitation is in progress.**
- steps, the **corpuls cpr** is ready for **minimal hands-off-time** for a final outcome.
- operability** of the **corpuls cpr** adapts the therapy to the individual patient.
- parameters can be adjusted during therapy.
- temperature** of the **corpuls cpr** is adjustable from 0 °C to +45 °C.
- certified according to **IP54**.



Start-/Stop Button



Stamp



On/Off Switch



Exd



Magnetic



# DEPLOYMENT IN EMS

## HIGH-PERFORMANCE AND FLEXIBILITY

In emergency situations, every minute counts. An efficient and decisive. By supplying fully automated chest compressions, **ensures less strain on rescue service personnel and continuous therapy, even in the most difficult situations.** After the stamp is positioned, there is more time for important tasks such as airway management or administering drugs.

## MINIMAL HANDS-OFF TIME

- The **quick and easy setup** helps to save precious time.
- The simple and still safe adjustment of the **corpulife** allows to switch from manual CPR to mechanical thorax therapy with minimal interruption.
- The **corpulife cpr is continually recording the data.** These can be evaluated with the software **corpulife.manager REVIEW** in debriefing.

## POSITION CHECK

LED START/ STOP Button	Display Symbol	Description
		<ul style="list-style-type: none"><li>• cpr arm too low</li><li>• Release of the thorax</li><li>• Therapy not possible</li></ul>
		<ul style="list-style-type: none"><li>• cpr arm too high</li><li>• Stamp has no contact</li><li>• Therapy possible, but not optimal</li></ul>
		<ul style="list-style-type: none"><li>• cpr arm adjusted optimally</li><li>• Full release and configuration depth can be achieved</li></ul>



# DEPLOYMENT IN AIR RESCUE

## THErapy UNDER EXTREME CONDITIONS

Almost every primary mission in air rescue makes extreme conditions a reality for the team and equipment. The patient often is in a critical condition and time is of the essence.

Transporting the patient and continuing a high-quality medical care is often impossible in these conditions. Here, the **corpuls cpr** e provides the high-quality thorax compressions and life-saving therapy also during

## FEATURES

- **Transport is possible while resuscitation is possible.** The design of the **corpuls cpr** arm allows even transport of the patient and treatment.
- **By means of the recboard, the corpuls cpr is fixed to the stretcher.**
- **The long battery running time and connection to the power supply guarantee a reliable and uninterrupted power supply.**



▶ In air rescue, patient access is extremely limited. A resuscitation without intermediate steps is possible or not effective in this environment. The **corpuls cpr** helps to stay on the scene and perform high-quality thorax compressions.



# IN HOSPITAL

## COMPACT AND RADIOLUCENT

The compact and very light-weight quadboard of the **corpuls** radiolucent carbon. Coronary angiographies can be performed with the **corpuls** for resuscitation without interfering artefacts. The hands-off principle is a minimum.



◀ Quadboard of the **corpuls**

## INTERFERENCE-FREE DIAGNOSTICS DURING ONGOING

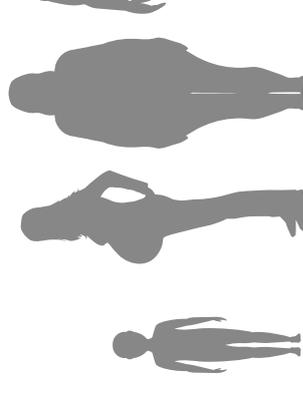
The flexible positioning of the **corpuls cpr** on the patient allows for interventions in the upper body and head area.

Therapy modes and parameters can be adjusted individually – anytime, whatever adjustment is necessary.



# INDIVIDUALISED THERAPY

With only one lever, the **corpuls cpr** arm is adjustable to fit every patient. The compression depth, freely adjustable between 80 and 100 mm, and the compression rate, adjustable between 80 and 100 mm/minute, allow an individualised therapy, even on children, with its intuitive operating concept is approved for the use from the age of 8 years and older.



Children from  
8 years of age

Pregnant women

Obese patients

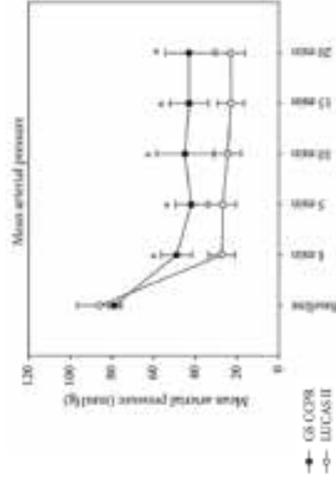
## FEATURES

- Treatment of children from 8 years of age, **pregnant women, very tall people and obese patients**
- Stress reduction due to safe application in an emergency situation – **more time** for other life-saving the
- **Re-usable stamps in two sizes.**
- **No limitations in regard to weight or size** of treatable patients.
- Resuscitation according to currently valid guidelines



## WE - FICALLY CONSIDERED

...nd that the **corpuls cpr** meets the **corpuls** brand. We conducted tests on all thorax and animal models. We were able to demonstrate that **corpuls cpr** generates a significantly higher blood flow and thus higher fusion pressure in direct comparison with other devices. We are also currently evaluating the device in practice with a follow-up



▶ The **corpuls cpr** generates a significantly ( $p < 0.05$ ) higher mean arterial pressure (MAP) over the total duration of the resuscitation (Eichhorn, 2017).



## EVALUATION OF MISSIONS WITH CORPULS.MANAGER REVIEW

The **corpuls cpr** continually saves all relevant settings and sensor data during the mission.

This includes compression depths and rates as selected by the user at each point in time, as well as movement and force feedback values during each individual compression.

The free software tool **corpuls.manager REVIEW** provides the ability to gain insights into this data. The entire mission is displayed as a scrollable timeline, showing compressions, settings, pauses and events.

Debriefings and CPR trainings among other things can be significantly improved by consulting the recorded real-time data – also PDF reports can be created from the mission. These can be added to the patient file for documentation purposes and archiving.

Additional insights on a larger scale can be obtained via the companion server software **corpuls.manager ANALYSE**.

Important questions about CPR quality and device usage can be quickly answered using the entire set of recorded missions. It is also possible to represent key performance indicators on data analytics dashboards. This solution can help to improve



▶ **corpuls.manager REVIEW**

Due to the synchronised therapy the **corpuls3** and **corpuls cpr** can be combined. These are displayed together on a timeline or evaluation becomes even easier.

<sup>1</sup> Garcia A, Schreiber U, Heller M, et al. Development and validation of an improved mechanical thorax for simulating stable chest stiffness and simulated blood flow. Med Eng Phys. 2017 May;43:64-70. Med Eng Phys. 2017;43:64-70. doi: 10.1016/j.medengphys.2017.03.018. PMID: 28242180.

<sup>2</sup> Sandler J, Stroh A, Heller M, et al. Corpuls cpr resuscitation device generates superior emulated flows and pressures than LUCAS II in a porcine model. Resuscitation. 2017 May;110:10-17. doi: 10.1016/j.resuscitation.2017.05.037.3. PubMed PMID: 28256484.

# SYNCHRONISATION OF CORPULS3 AND CORPULS CPR

for a long time: The perfect interaction between the **corpuls3** monitor/monitor **corpuls3** and our mechanical device **corpuls cpr** during resuscitation.

The next level of resuscitation processes to the next level of resuscitation. The **corpuls3** stands on a modular design, the **corpuls3** stands on a modular design. It can be separated into two main components: the **corpuls3** Patient Box and Defibrillator/Pacer.

The **corpuls3** is designed for synchronised therapy, stress amongst the

team can be significantly reduced. **corpuls3** and **corpuls cpr** become one and when integrated into the team, this duo makes resuscitation even more efficient.

Hands-off time is significantly reduced\* and the patient's chance of survival is increased – even under the most difficult conditions where space is at a premium.

Even after the mission, synchronisation still continues. In **corpuls-manager REVIEW**, all mission data from the **corpuls3** and **corpuls cpr** are represented together as one mission.



## BENEFITS OF SYNCHRONISED THERAPY

- **More time for important procedures**
- Also in **confined spaces**
- **At one glance all data** on the display
- **Merging of missions in corpuls-manager REVIEW**

## FULL CONTROL – AT ANY TIME

Once connected to each other, it is no longer necessary to operate the **corpuls cpr** during a resuscitation. The **corpuls cpr** is completely automatically controlled by the **corpuls3**, regardless of whether it is in AED or manual mode. All therapy parameters of the **corpuls cpr** are displayed on the monitor of the **corpuls3**.

During synchronised therapy, the **corpuls3** does not just the remote control for the **corpuls cpr** – although that is also possible – but also the **corpuls3** has been perfectly integrated into the manual mode of the **corpuls3** rescue team the ability to operate the **corpuls3** in accordance with the current recommendations. The **corpuls3** shows information on its display.



Connect key to the **corpuls3**



Bluetooth icon  
Bluetooth connection  
**corpuls cpr**



Pie chart with **corpuls3** indicates a connection  
**corpuls cpr** and **corpuls3**  
2 minute resuscitation



**Start/Stop key** the mechanical connection  
by the **corpuls3**



Reset the time in **corpuls3**  
if not defibrillated

the **corpuls3** as the central operating unit. The user only needs to monitor the stamp of **corpuls cpr** is correctly positioned. All control commands for the user take place wirelessly between **corpuls3** and **corpuls cpr**.

ditioned on the patient and is performing chest compressions. connection to a **corpuls3**.

interrupts the **corpuls cpr** for the **AED** analysis. When automatically continues the therapy. When **shockable**, the defibrillator is charged. When **not shockable**, the **corpuls cpr** for shock therapy is interrupted.

When **not shockable**, the **corpuls cpr** therapy is interrupted.

### Procedure according to ERC

When the **corpuls3** interrupts the manual rhythm control.

When the **Shock key** resumes chest compressions/

When **shockable**, the **Shock key** interrupts manual rhythm control.

When **not shockable**, the **Start mCPR key** resumes manual rhythm control.

### Procedure according to AHA

When the defibrillator.

When the **corpuls3** interrupts the manual rhythm analysis.

When **shockable**, the **Shock key** interrupts manual rhythm control.

When **not shockable**, the **corpuls cpr** resumes the therapy by the **corpuls cpr**.

The ERC guidelines recommend the shortest possible compression interruptions during cardiopulmonary resuscitation. Before and after the shock delivery, chest compressions should be interrupted for a maximum of 10 seconds. A peri-shock pause (the compression break before and after defibrillation) of a maximum of 10 seconds has been scientifically proven to be associated with a higher survival rate (Cheskes et al. 2014; Sell et al. 2010). According to the ERC guidelines, the entire

manual defibrillation process should be interrupted for a maximum of 5 seconds (Mansour et al. 2015). When using the **corpuls3** in combination with the **corpuls cpr** in an in-house study, these recommendations are noticeably undercut. With the synchronized **corpuls cpr**, this endeavour could be achieved with a higher survival rate (Cheskes et al. 2014; Sell et al. 2010). According to the ERC guidelines, the entire

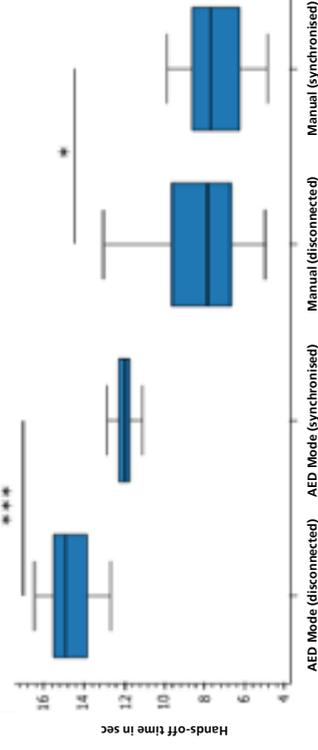


Illustration 1: Representation of the hands-off time comparing synchronised and disconnected operation of the **corpuls3** (Significance  $P < 0.001$ ).

The reduction in the compression pause is particularly evident during the perishock pause. On average, the perishock pause in synchronised mode of  $2.00 \pm 0.32$  s is 38.23% shorter than

the peri-shock pause in disconnected mode. This saving can be a valuable gain in time, breaking being a maximum of 5 seconds.

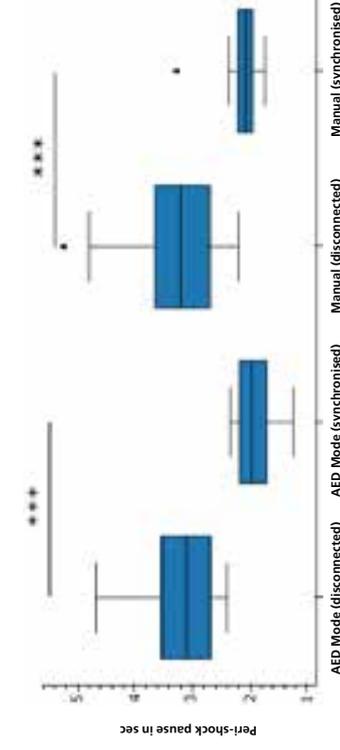


Illustration 2: When comparing the significant minimization of the peri-shock pause duration with synchronised operation of the **corpuls3** and **corpuls cpr** becomes evident (Significance  $P < 0.001$ ).

### Sources

Cheskes, Sheldon, Schmicker, Robert H., Verbeek, P. Richard, Salcido, David D., Brown, Stobhan P., Brooks, Steven et al. (2014). The impact of peri-shock pause on survival from out-of-hospital shockable cardiac arrest. *Resuscitation* 85, S. 336-342. DOI: 10.1016/j.resuscitation.2013.10.014.

Kleinman, Monika E.; Brennan, Erin E.; Goldberg, Zachary D.; Swor, Robert A.; Terry, Mark; Bolrow, Benley J. et al. (2015). Part 5. Adult Basic Life Support and Cardiopulmonary Resuscitation Quality Improvement: A Consensus Document from the International Liaison Committee on Resuscitation (ILCOR). *Resuscitation* 95, S. 1-80. DOI: 10.1016/j.resuscitation.2015.07.036.

Mansour, Koenraad G.; Nolan, Jerry P.; Bossaert, Leo L.; Greif, Robert; Macrocchie, Jan K.; Nikolou, Nikolaos I. et al. (2015). European Resuscitation Council Guidelines for Resuscitation 2015. Section 1.1. *Resuscitation* 95, S. 1-80. DOI: 10.1016/j.resuscitation.2015.07.036.

Nolan, Jerry P.; Soar, Jasmeert; Zidekman, David A.; Barent, Dominique; Bossaert, Leo L.; Deakin, Charles D. et al. (2010). European Resuscitation Council Guidelines for Resuscitation 2010. Section 1.1. *Resuscitation* 71, S. 1-80. DOI: 10.1016/j.resuscitation.2010.02.004.

In the steps, the **corpuls cpr** can be adapted to the patient in a very short amount of time and with a minimum interruption of thorax compressions.

## ATTACHMENT



## 2. ATTACH

The **corpuls cpr** arm on the board and switches the **corpuls cpr** on. Then, the locking lever is able to move the **corpuls cpr** arm. The user checks the displayed therapy settings and the patient's head.

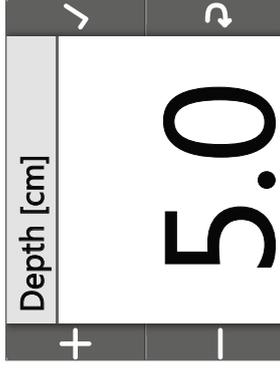
The team lifts the upper body of the patient and positions the board completely beneath the patient within a few seconds. For this, the thorax compressions must only be interrupted minimally.

## STARTING & STOPPING

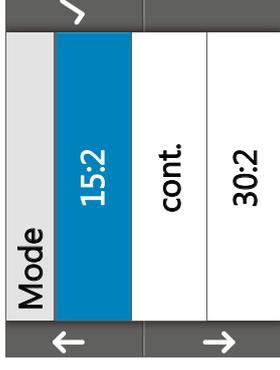


The **corpuls cpr** arm is positioned over the thorax. The **corpuls cpr** arm is adjusted in height and angle and a team member adjusts the stamp position on the thorax. Then, the **corpuls cpr** arm is locked by closing the locking lever and the mechanical thorax compression started by pressing the **START/STOP** key.

## START PREPARATION



Via the softkeys settings such as compression depth or compression rate are configured.



You can select three different therapy modes:

- 15:2
- continuous
- 30:2



The integrated locking lever indicates possible locking lever is n

The main menu shows the compression rate (30:2, 15:2, continuous) as well as the respiration depth and therapy duration.



Thorax is essential for treatment of a patient. The Recboard or the Quadboard can be used in multiple positions beneath the patient for alignment on the thorax. The position of the stamp. That is the position at which manual compression is performed. The user finds the proper neutral position and the therapy starts. When the light is closed and the therapy started, the **corpuls cpr** monitors the position of the thorax after 100 compressions, the **corpuls cpr** automatically monitors the distance between the stamp and the patient so that the set compression depth is

The patient can be transported with the **corpuls cpr** on different transport systems, if the patient is secured with a corresponding securing system. Make sure to leave the therapy zone uncovered.



▶ Use with Recboard Ring

## MANAGEMENT

The device can be operated with a battery as well as with a power supply. The long running time of the battery guarantees optimal operational readiness. The remaining running time in minutes.

The battery can be exchanged quickly and easily with one operation. When using the device in a rescue vehicle, the power can also be supplied via the magnetic clip directly from the on-board power supply.



▶

The LEDs of the charging status display give a quick overview of the remaining

▶ By pressing both release buttons, the battery can be exchanged quickly and easily.

## HIGH SAFETY FOR PATIENT AND RESCUE SERVICE PERSONNEL

The **corpuls cpr** contributes greatly to the safety of ambulance service staff. They can remain seated during therapy, which reduces the danger in case of an accident. To demonstrate this safety, the **corpuls cpr** has been tested according to the following standards:

- EN 60068-2-6:2008 Vibration (sinusoidal)
- EN 60068-2-27:2009 Shock
- EN 60068-2-64:2008 Vibration (Broadband random and guidance)
- EN 60529:2014-09 Degrees of protection provided by enclosures (IP-Code)
- IEC 60601-1-12:2014 Medical electrical equipment – Part 1-12: General requirements for basic safety and essential performance
- EN 13718-1:2014 Medical vehicles – Air ambulances – Part 1: Requirements devices used in air ambulances;
- DO160G:2016 Section 7, Category A and B
- UJ02 Environmental Conditions and test methods for Airborne Equipment
- EN 1789:2007+A2:2014 Medical vehicles – Road ambulances – Requirements for their equipment

With the support of company Stollenwerk & Cie. GmbH and the University of Trier a further dynamic crash test was carried out which proves that the **corpuls cpr** can perform high-quality chest compressions even in the extreme situations of an accident without endangering the patient or rescue

service personnel. To test this, a simulator was used. The simulator was mounted on a stretcher set up as a dynamic test rig. The simulator performed chest compressions on a

of carbon and are therefore mostly **radiolucent**. They are also very **easy to clean** thanks to their



## SPECIFICATIONS

### COMPRESSION PARAMETERS

- Compression rate: 80 – 120 compressions per minute (adjustable in increments of 1 compression per minute)
- Compression depth: 2 – 6 cm (adjustable in increments of 0.1 cm)
- Therapy mode: 30:2 / 15:2 / continuous (secure airway)

### OPERATING PARAMETERS:

- Power source: electric
- Battery: Lithium Polymer (LiPo)
- Power supply: 12-33V DC (on-board power), 110-240V AC (Mains 50-60 Hz)
- Battery with 300 charging cycles
- Operating time: typical 90 min.
- Displays the remaining running time in minutes
- LED indication of battery charge level in 20% increments
- Battery charging time (via magnetic clip): 105 min. 0-80% 30 min. 80-100%
- Intuitive user interface: Therapy start/stop button with LED display and 4 softkeys

### GENERAL SPECIFICATIONS:

- Color display 2.8" (4.3" optional)
- Operating temperature: -20 °C to +45 °C
- Dust and splash protection: IP65
- Operating noise: < 65 dB(A)
- Data interface: RS485
- Integrated alarm: siren
- RTCA DO 160 compliant
- Simultaneous compression and ventilation
- Time/therapy display: 0-999 min
- Remaining running time: 0-999 min
- Battery in minutes: 0-999 min

### DIMENSION AND WEIGHT:

- **corpuls cpr** alarm: 45 x 43 x 9 cm
- **corpuls cpr** alarm with battery: 47 x 47 x 3.5 cm
- Quadboard: 46 x 46 x 13 cm
- Scoopboard: 45 x 35 x 83 cm



## SCOOPBOARD

- Ideal for **technically demanding operations with a scoop stretcher**
- Compatible with most common scoop stretchers
- Fastening straps with magnetic clasp and fixation ring for secure fixation of the patient



## RECBOARD

- Specifically developed for use in **emergency services and preclinical setting**
- Compatible with all common stretcher systems
- Fastening straps with magnetic clasp and fixation ring for secure fixation of the patient



## BAG & BACKPACK FROM PAX®

- Tailor-made for the **corpuls cpr**
- Room for all accessories (stamp, reserve battery, external mains converter)
- Storage compartment for a board
- Charging status indicator and possibility of charging the arm in the bag

## ADDITIONAL ACCESSORIES FOR HOSPITAL

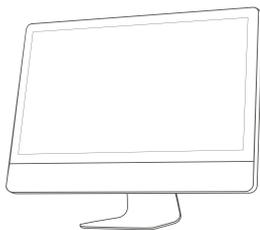
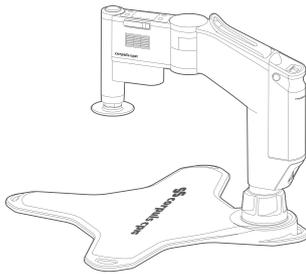
of the **corpuls cpr**

ne

possible in crash cart



More at [www.corpuls.com](http://www.corpuls.com)



For almost 40 years, **corpuls®** has developed and produced innovative high-end equipment for emergency and intensive care medicine. Today, in our headquarters in Kaufering, over 300 hearts each beat around 60,000 times every work day while aspiring to meet the high standards of rescue service personnel from over 70 countries around the world.

**corpuls** defibrillators, patient monitoring systems and chest compression devices have set the standard since day one in the realisation of the most advanced insights in medical science, as well as in terms of innovation and ergonomics. Thus guaranteeing reliable and trusted aid in the fight for human lives.



Manufacturer:

**corpuls | GS Elektromedizinische Geräte  
G. Stemple GmbH**

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