

corpuls system



corpuls®

FOCUS - ON - PATIENTS



STRONG NETWORKED COMPLETE

From the new **corpuls3T** to the 22-lead ECG: world firsts with a solid foundation

From synchronisation to virtual: the **corpuls system** links devices, people and places

From simulation technology to big data management: the **corpuls system** closes the loop



corpuls®

Manufacturer:

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

Hauswiesenstrasse 26 | 86916 Kaufering | Germany

Phone +49 8191 65 722-0

E-mail info@corpuls.com

Internet www.corpuls.world



ECGmax/CEB® products are registered trademarks of VectraCor | 785 Totowa Road, Suite 100 | Totowa | NJ 07512 | USA



ZOLL Medical Corporation
269 Mill Road | Chelmsford | MA 01824-4105 | USA



* coPatch CPR is a licensed product of the ZOLL Medical Corporation

Products may not be available in all markets as product availability depends on regulatory and/or medical procedural requirements in individual markets. For information on availability, please contact info@corpuls.com. GS Elektromedizinische Geräte reserves the right at any time to modify the design and/or build of the device. No liability shall be assumed for any typos, errors or omissions in this brochure. All product names referenced are registered trademarks of their respective owners. Item No. 76144.00020 Vers. 1.0 (10/20)

DEAR READER,

Some things seem like they couldn't possibly be improved upon. Until they actually are. For nearly forty years, this attitude has encouraged us to be more flexible and ambitious than others. Every one of our new products is designed with perfection in mind. Nevertheless, we continue to meet these high standards time and time again, not just because we enjoy doing our part to save more lives, but because, as pioneers in the medical field, innovation is the lifeblood that flows through our veins. Thanks to our culture of innovation, we've developed an intelligent, high-performance network of solutions and technologies for our customers that has ultimately become so much more than just the sum of its parts. We've given it a simple, definitive name: the **corpuls system**.

Emergency and intensive care medicine will never be completely predictable. Every rescue mission, whether in the field or clinic, is urgent and as different as each patient. Whether it's a global pandemic or day-to-day practice, whenever seconds make the difference between life and death, where adrenaline and concentration fully exhaust the user's physical limits, you need the right solution as well as precise, reliable and adaptive technology immediately at hand. This is the aim of the **corpuls system**, which features a fully compatible, modular device and digital ecosystem with integrated wireless communication that enables seamless automatic transmission and assessment of data. Whether it's bystander CPR or the ER, simulation training or a 22-lead ECG with state-of-the-art telemetry solutions, on land or water, in the mountains, in the air, on ice, snow or in combat, **corpuls** has the innovative tools and interfaces needed to allow you to implement complex interventions effectively and successfully. In more than 70 countries and several million rescue missions a year.

Theodore Roosevelt once said 'Do what you can, with what you have, where you are'. In our case, we would put it like this:

The corpuls system ensures that you can do more, because you have more, no matter where you are.

The following 80 pages will take you on a journey of the diverse **corpuls** portfolio so you can put together the system that precisely serves all the facets of your special range of needs.

We look forward to accommodating each and every one of your requirements and requests. This is, after all, what gives us the inspiration for all our products.

Kind regards,



Dr. Christian Klimmer
CEO



Iris Klimmer
CFO



Klaus Stemple
CTO





CONTENT



corpuls system

From rescue chain to rescue network



corpuls3T

The masterpiece taken to the next level



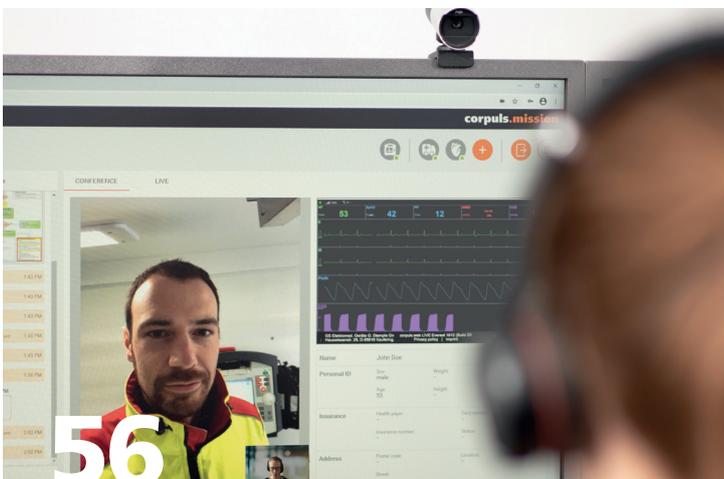
corpuls cpr

The powerful arm that saves lives



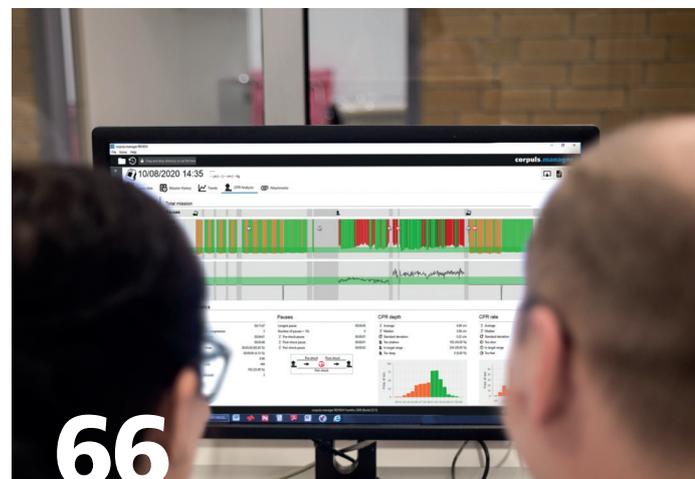
Synchronisation

A perfect duo: the corpuls3 is the 'brains' behind the corpuls cpr



corpuls.mission

Telemedicine redefined



corpuls.manager

Big Data (in the medical field): Efficiency, control and knowledge



18

The corpuls3
or
the secret of eternal youth



20

ECGmax
The new standard
in ECG diagnostics



34



42

corpuls1
The ultracompact patient monitor
and defibrillator



48

corpuls aed
The **corpuls** among AEDs



74

High-quality CPR
From children to air rescue:
Highest level CPR for everyone, anywhere



78

corpuls simulation
Train how you fight for lives

THE CORPULS SYSTEM: FROM RESCUE CHAIN TO RESCUE NETWORK

The rescue chain is both a time-honoured standard and basic concept in emergency and intensive care medicine. Each piece of the chain is interlinked: well-rehearsed interaction and communication makes the next step and the jobs of the next rescue unit easier. When everything functions smoothly, the rescue chain saves lives. Today, modern communications technology and networking have a huge impact on the rescue chain. Meanwhile, new digital options are converting many of the linear processes in the chain into parallel network processes. The **corpuls system** has stayed on the leading edge of this development. Our world of devices and solutions continues to expand its networking capabilities, becoming more intelligent, more independent, more communicative and secure, faster and more effective. A complete system that is more than just the sum of its parts.

It goes without saying that the treatment of medical emergencies continues to follow a specific chronological timeline. The **corpuls system**, featuring the **corpuls aed**, **corpuls1**, **corpuls3**, **corpuls cpr** and **corpuls.mission**, can support your rescue team throughout these steps as synchronously and interactively as possible, both today and in the future. Highly compatible products and accessories, flawless communication between products and, naturally, error-free multidirectional distribution of real-time information are all crucial for efficient, effective operations.

The **corpuls system** can prepare all participants in advance for an upcoming rescue mission. **corpuls.manager**, for example, offers rescue services a transparent view of the data collected from all corpuls devices, enabling them to implement effective measures based on this information. This also includes targeted training. With **corpuls simulation**, the training is so close to the real thing, you can almost see the blue lights and hear the sirens. And thus the chain is complete.

SIMULATION

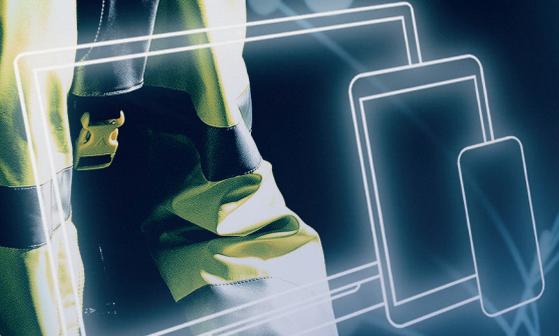
AED

COMPACT MONITORING & DEFIBRILLATION

DATA MANAGEMENT

22 LEAD ECG & CEB

AUTOMATED CPR



MODULAR MONITORING & DEFIBRILLATION

MULTICHANNEL LIVE TELEMETRY



THE MASTERPIECE TAKEN TO THE NEXT LEVEL

The **corpuls3** is a unique, revolutionary concept within the medical device industry. Thanks to its modular design, the patient monitor with integrated defibrillator/pacer stands out radically from other compact devices. With outstanding ergonomics, clean smooth lines and user-friendly operation, corpuls3 satisfies the most exacting needs of users. Now with a touchscreen.



CAT

CORPULS3 THE NEXT GENERATION

The corpuls3 is not only a device – it is a 3 module system:

- Monitoring Unit**
- Patient Box**
- Defibrillator | Pacer**

The modules can be separated at any time, as and when required. They communicate wirelessly, eliminating annoying cables.

The corpuls3 adapts optimally to the users needs. Legendary and still unique, the corpuls3 is used successfully by hundreds of organizations around the world.

COMMUNICATION PROFESSIONAL

The built-in connectivity functions such as 4G modem, WLAN or LAN are ideal for telemedicine and the corpuls communication platform corpuls.mission.

The corpuls3 is available in three versions:

- corpuls3 TOUCH
- corpuls3 CLASSIC SLIM
- corpuls3 CLASSIC



MODULAR AND UNIQUE

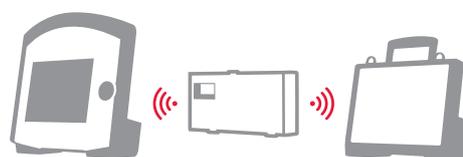
- **Constant monitoring** from the emergency site to the hospital
- **Uninterrupted monitoring from a safe distance** (for example; in CT)
- Better **ergonomics** for patient transport by separating the modules
- Increases **patient safety** by recording and storing parameters in direct proximity to patients
- More **flexibility** at the mission site due to the separation of different tasks: Display, data recording and therapy

SPECIFICATIONS

- Transflective **8.4" display, with optional Touch**
- **Wide printer** (106 mm)
- **Weight:** 6.5 kg (**SLIM**, basic configuration)
- **Dimensions** of complete device (WxHxD):
30.5 cm x 29.6 cm x 19.5 cm
(**corpuls3 SLIM CLASSIC & TOUCH**)
- Extremely high **dust and splash protection** (IP55)
- **Battery life** 7-10 hours,
according to settings and demands
- **Operating environment:**
-20 °C to +55 °C
(basic functions: ECG monitoring and defibrillation)
- **DIN EN 1789**
- Conforms with selected sections of the
international **Standard for Airborne Equipment**
RTCA DO 160 G
- Conforms with selected sections of the
US Military Standard MIL STD 810 G



► Illustration of the **corpuls3T**.



► The unique wireless RF technology allows the modules to communicate with one another as if they were connected by cables.



► Our **corpuls3 CLASSIC SLIM** is naturally also still available for purchase.

THE MONITORING UNIT

The Monitoring Unit is the control centre of the **corpuls3**. At just 2.9 kg, including the battery and printer paper, it is about as thick as a newspaper and can be comfortably held in one hand.

COMPLETE CONTROL

Up to 6 curves and 13 vital parameters can be displayed simultaneously on the high-resolution 8.4" display. They can be freely customised and defined, and the display for NIBP monitoring includes several important quality indicators. In addition, up to 6 curves can be printed in real time.

OPERATING CONCEPT "TOUCH 'N' DIAL"

We employed a novel operational concept for the **C3T** that combines the best of two different operational control concepts. The **TOUCH 'N' DIAL** experience

- On the one hand, **the classic operational capabilities of softkeys and jog dial**
- On the other, **intuitive touch control operation.**

We chose this approach because softkeys and jog dial are more reliable for some applications while touch works better for others. This is the rationale behind the concept: optimal operation right when you need it.

Last but not least, there is the safety aspect: should the touch control not work as expected, the device can always be operated with softkeys and jog dial, which is especially important during life-or-death situations such as resuscitation.

EXTREMELY ROBUST TOUCH TECHNOLOGY

Touchscreen technology needs to be up to the task. This is especially the case in difficult operating environments. This is why we rely on the latest generation of touchscreen controllers.

These make the touch display of the **C3T**

- **moisture resistant** and
- **safe to operate** with disposable gloves.

The device is extremely user friendly thanks to its high-quality, optically bonded display, high-contrast resolution and low reflectivity.



▶ **TOUCH 'N' DIAL** in **C3T**: Operation via jog dial or the optional touch interface.

corpuls control

THE POWER OF CORPULS3 ON YOUR WRIST



The **corpuls control** is a revolutionary addition to our **corpuls3** product line.

corpuls control is a miniaturised **corpuls3** monitor for your wrist. Just like its big brother, it displays a variety of vital parameters and alarms. They can be confirmed on the **corpuls3** via the **corpuls control**. It can easily be worn over overalls or a coat. If the patient monitor is not close enough for quick access, the **corpuls control** is a great solution.

The TFT multi-touch display can also easily be operated with disposable gloves.



► Illustration shows the **corpuls3T** monitor.

SPECIFICATIONS

- Up to **6 curves and 13 vital parameters**
- Diagnostic **12-lead ECG preview**
- **Quick access** to important menu items via 7 softkeys and function keys
- **1-2-3 operation** in defibrillation modes
- **Wide printer** (106mm) with simultaneous real-time print-out for up to 6 curves
- **4G modem** and WLAN or LAN port for **data transmission/telemedicine**
- All-around **impact protection**
- **Weight:** just 2.9 kg
- **Dimensions (WxHxD):** 30.5 cm x 29.5 cm x 12 cm

BRACKETS

- **Lightweight** and **shallow mounting depth**
- Also **suitable** for a **combination of monitor and patientbox**
- **Power supply:** **12 Volts DC** or **100-250 Volts AC** (optional)
- **DIN EN 1789**





THE PATIENT BOX

The Patient Box is the "heart" of the system. It collects, records, and stores all vital parameters and measurements. Values recorded via pre-connected sensors are transmitted in real time wirelessly to the monitoring unit, where they are displayed and/or processed.

CONSTANT COMPANION

Due to its low weight (between 1.1 and 1.4 kg, depending on equipment), the patient box is so compact that it can stay with the patient during transport.

This also means that all the sensors and cables can remain on the patient. This not only keeps them out of harm's way, but also enables seamless monitoring - for example, when transporting a patient through a narrow stairwell.

The Patient Box can operate completely autonomously. The backlit monochrome display enables patient observation even without a monitoring unit (including voice recording and acoustic alarms).

All data can be stored for later transmission.



► The small screen is located on the front of the Patient Box.

Data export via:

- Bluetooth
- CompactFlash® card

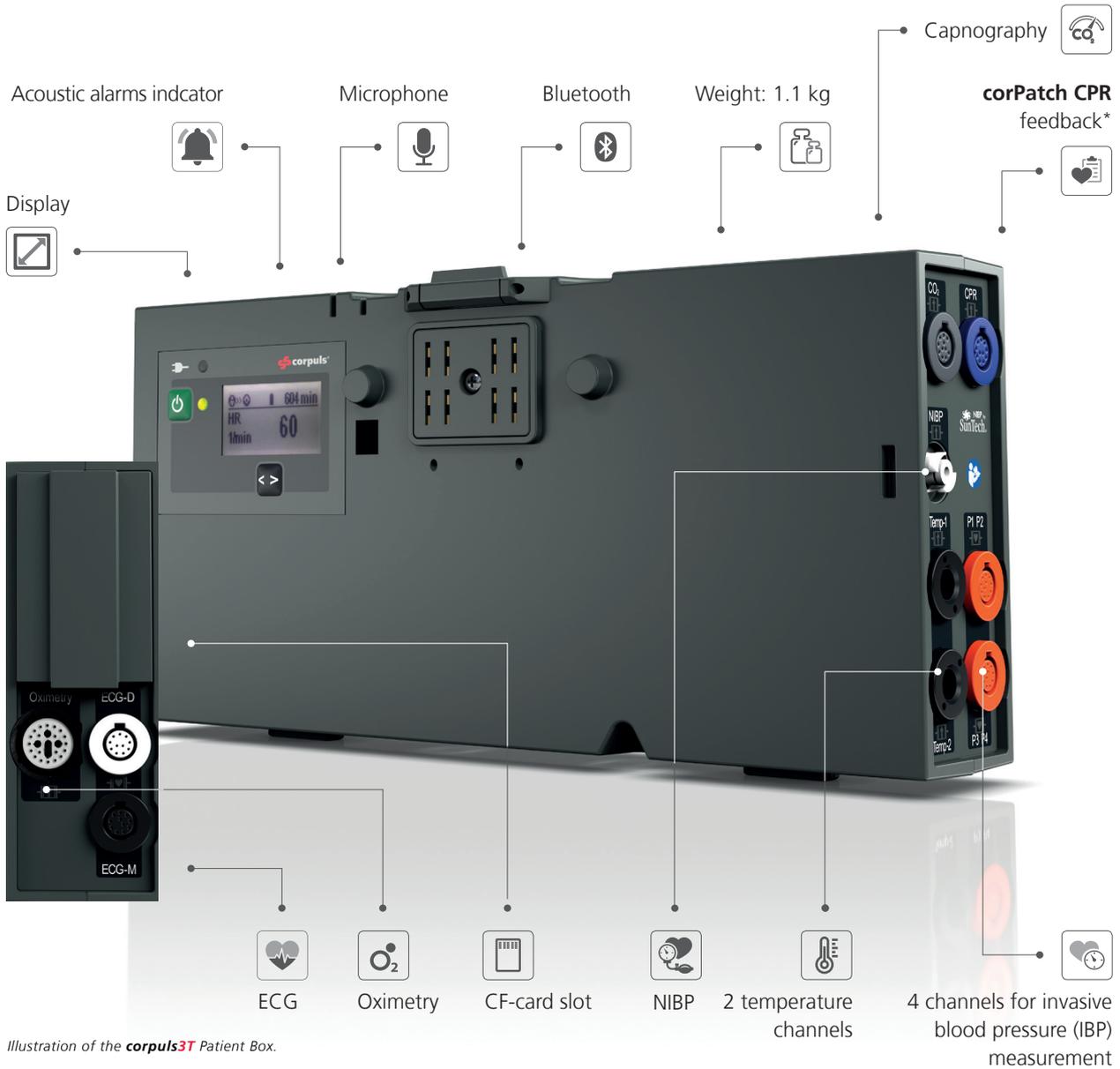
PATIENT BOX ACCESSORY BAG XL



What would the heart of the system be without the perfect packaging? A well-designed accessory bag for your cables and sensors brings calm to a stressful mission. In collaboration with **PAX®**, we've optimised and improved the Accessory Bag based on feedback in recent years.

The new Patient Box Accessory Bag XL offers even more storage space for additional blood pressure cuffs and CO₂ cuvettes, among other things. For those who operate the **corpuls3** in the basic configuration, the standard version is still available.





► Illustration of the corpuls3T Patient Box.

SPECIFICATIONS

- **12-lead diagnostic ECG**, heart rate
- **ECG analysis and information software**
- Masimo Rainbow SET® technology for **SpO₂, PP, PI, SpCO, SpMet, SpHb**
- **Non-invasive blood pressure measurement** (SunTech®)
- **Capnography** with mainstream capONE® technology
- **corPatch CPR Feedback***
- 2 channel **temperature measurement**
- 4 channel **invasive blood pressure measurement**
- **Display** of vital parameters, time remaining and alarms
- Acoustic **alarms**
- Microphone for **audio recording**
- **Bluetooth and CompactFlash®**
- **Weight:** just 1.1–1.4 kg
- **Dimensions (WxHxD):** 26.5 cm x 13.5 cm x 5.5 cm

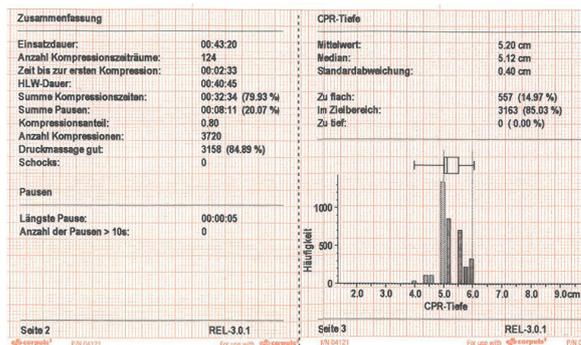
ACCESSORIES

- Options for adaptation to **common stretcher systems**
- **Easy to adapt and reconfigure**
- **Power supply:** 12 Volts DC or 100-250 Volts AC (optional)
- **DIN EN 1789**



THE DEFIBRILLATOR | PACER

The modular design of the **corpuls3** allows complete mechanical separation of the Defibrillator/Pacer. However, the modules remain wirelessly connected. This significantly reduces the weight of the **corpuls3**-System, which improves the mobility and flexibility of the system during urgent patient transfers, such as from the ambulance to the hospital. In this configuration, the patient can be remotely shocked from a safe distance via the monitoring unit (in connection with the **corPatch** therapy electrodes).



► The 'CPR Summary' can be printed out on site immediately after use, enabling immediate debriefing after a resuscitation.

SPECIFICATIONS

- **Biphasic rectangular impulse**, impedance compensated
- **2 to 200 Joule** configurable energy protocol
- **AED and manual defibrillator**
- **AED protocol** per the applicable, current guidelines, updateable at all times
- **Pacer** with FIX-, DEMAND and OVERDRIVE modes
- **Pre-connected corPatch therapy electrodes** in a dedicated pouch
- **Up to 200 shocks** on a fully charged battery
- Can be used with either **shock paddles** or **defibrillator pads**
- **Weight:** 2.5 kg (**corpuls3 SLIM**)
- **Dimensions (WxHxD):** 28 cm x 22 cm x 12 cm

corPatch CPR* FOR HIGHER QUALITY RESUSCITATION



- **Improved resuscitation quality** thanks to immediate feedback on the depth and frequency of compressions
- **Reliable self-adhesive application**
- **Easy positioning**
- **Data analysis with corpuls.manager** for mission debriefing and training



 Battery capacity for up to 200 shocks

► Figure shows the **corpuls3T** Defibrillator/Pacer.



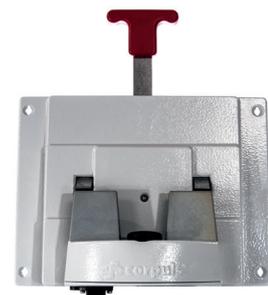
► The defibrillator is optionally available with shock-paddles and a 30°-swivel base.



► Defibrillator pads are available in three sizes for use in open-heart surgery.

BRACKETS

- **One-hand** handle release
- 10-second **auto-locking** feature
- **Power supply:**
12 Volts DC or 100-250 Volts AC (optional)
- **DIN EN 1789**





THE CORPULS3

OR

THE SECRET OF ETERNAL YOUTH

The formula for designing intelligent medical devices seems obvious at first – improve upon a good thing, fix any issues, and find solutions to any challenges that arise.

This is exactly the **corpuls DNA** which made groundbreaking inventions such as the **corpuls3** possible in the first place. The original idea was formulated years ago when experts were exchanging ideas at an air rescue convention. How can we install and use a defibrillator/monitoring system in confined spaces? How can we also ensure the optimal protection of patients and rescue workers during continuous resuscitation in a transport vehicle? The naysayers said we'd have to slice the device in two, but **corpuls** would never have come into fruition if our engineers weren't already used to thinking outside the box. 'Why not just try and design a three-fold device', they reasoned, without being aware of the important ramifications the device would end up having on the medical device industry. No sooner said than done: in 2007, at the MEDICA international medical device convention, we presented the world's first (and still only) device that combines all key features into one handy, compact system equipped with a state-of-the-art wireless communication module. And with each new generation, it continues to become more powerful, more intelligent and more versatile.

Nobody at the time could have known that a lasting revolution was about to take the medical device industry by storm, thanks to a basic concept that, in principle, provided a solution for every conceivable application. Still today, the fourth generation of the **corpuls3** remains the international bench-

mark for emergency and intensive care medicine. Thousands of EMS and clinics across the world as well as countless armed forces, research institutions, air rescue teams fire departments, mountain and sea rescue services, anaesthesiologists, emergency medical physicians and paramedics trust the most reliable, flexible and intelligent defibrillation and monitoring system of our time under all kinds of challenging conditions. We naturally take great pride in this, and it motivates us, as the leader in so many international markets, to constantly make the **corpuls3** even more powerful, more intelligent and more versatile.

Over time, the device developed a control centre or 'brain'. The **corpuls3** and the 3-dimensional **corpuls system** provides you with a bird's eye view of the job at all times. **corpuls3** communicates locally with everybody involved, controls the mechanical CPR provides 22-lead measurement capabilities and reliably collects and transmits data for on-the-spot analysis or later review. And, best of all, its roomy side pockets allow you to keep everything you need for the job close at hand. It's lightweight, ergonomic, resistant to environmental impacts and also attractive. While looks aren't everything, the **corpuls3**'s clean lines and innovative design make it comfortable to use on a daily basis and easy to operate. The **corpuls3** is like a constant companion - always by your side to help you save lives. It won't make anyone's job obsolete, but can serve as a valuable coworker. It has gained a lot of knowledge in its decades of experience. You can rely on the **corpuls3**. It's more than just a medical device.





ECGmax



ECGmax

THE CORPULS ECG REVOLUTION

Over 20 years ago, **corpuls** introduced rescue services to the first 12-lead ECG. It's been the gold standard in ECG diagnostics ever since. **Until now.**

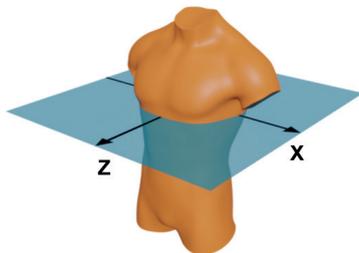
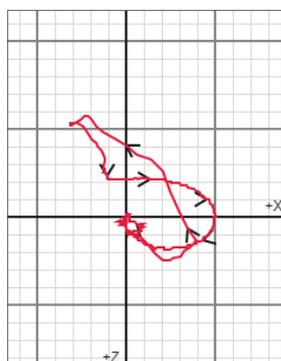
In 2020, **corpuls** once again revolutionised the ECG: With the **ECGmax**, you don't have to settle for the typical 12-leads. You get a generous 22-leads – that's ten additional real-time views of cardiac electrical activity, providing a more detailed, comprehensive picture of the patient's condition. The current guidelines of the European Society of Cardiology (ESC) call for examination of the extended

posterior V7-V9 leads and the right-sided ventricular V3r-V6r leads. No additional effort is required and no electrodes need to be attached or repositioned. Any additional lead is calculated on the server and can be displayed or measured in **corpuls.mission** as well as forwarded as a PDF attachment via e-mail or fax over the **corpuls** gateway.

- Advanced **22-lead** diagnostics
- **Posterior leads** V7–V9
- **Right-sided ventricular leads** V3r–V6r
- **Orthogonal leads x,y and z** and associated vector loops
- **Only 10 electrodes**, extremities and chest leads
- Displays on any **corpuls3** with the telemetry option

VECTORCARDIOGRAPHY

According to Frank, cardiac electrical signal propagation can be considered to be a rotating dipole for vectorloops. The pattern formed by the peaks of these vectors can be spatially represented as loops in a three-dimensional coordinate system. The resulting loops correspond to the P wave, the QRS complex and the T wave, respectively. In healthy myocardial tissue, the loops appear homogeneous and the pattern is fluid. In the case of a dysfunction, the excitation propagation is irregular and the resulting loop appears jagged or disordered.



- **Electrical signal propagation** considered as a rotating dipole
- Represented as **loops in the coordinate system**
- The loops correspond to the **P wave, QRS complex** and **T wave**
- Physiological loops appear **homogenous and fluid**
- Pathological loops appear **jagged and irregular**

► Vectorloops associated with an apically-located STEMI.



CEB® THE CARDIAC ELECTRICAL BIOMARKER

In addition, **ECGmax** can determine the **Cardiac Electrical Biomarker CEB®** using the same leads. Thanks to the CEB's three colour-coded indicators – normal, atypical and abnormal – interpretation is easy. The user recognises right away whether myocardial ischaemia is present – with sensitivity and specificity that compares to troponin.

- **Simple interpretation** based on a "traffic light" concept
- **Correlation of the CEB® with troponin**
- **No additional electrodes** required
- **Non-invasive measurement**
- **Continuously measured value**
- **High sensitivity and specificity**
- **Rapid response** through measurement of the electrical field



corpuls.science ECG

The **corpuls.science ECG** offers clinical observations and published scientific data in relation to the ECG. Among other things, it shows basic information about the ACS algorithm or signal filtering of an ECG in a concise, insightful manner. At the same time, it offers a wide variety of research articles to promote clinical accuracy and effective diagnostic use of the calculated 22-lead ECG, the vector loops and the CEB®.



SCAN THE
QR-CODE



READ THE
E-BOOK





THE CEB® DEMONSTRATES HIGH SENSITIVITY AND SPECIFICITY IN THE DIAGNOSIS OF MYOCARDIAL INFARCTION

In their study 'Detection of acute myocardial ischemic injury by gender using a novel cardiac electrical biomarker', Schreck et al. (2015) examined the diagnostic accuracy of CEB® for the detection of an acute myocardial infarction (AMI) in men and women. Therefore the authors used calculated ECG leads based on a standard ECG. The CEB® was determined based on the calculated ECG. A value higher than 94 confirmed an AMI, while a value less than 66 was considered to be negative. As a point of reference, the electrocardiograms were reviewed by two blinded physicians and assessed by mutual agreement. Additional standard ST-segment analyses and automated ECG interpretations served as the active control group. In the first step, calculated and recorded ECGs needed to be checked for

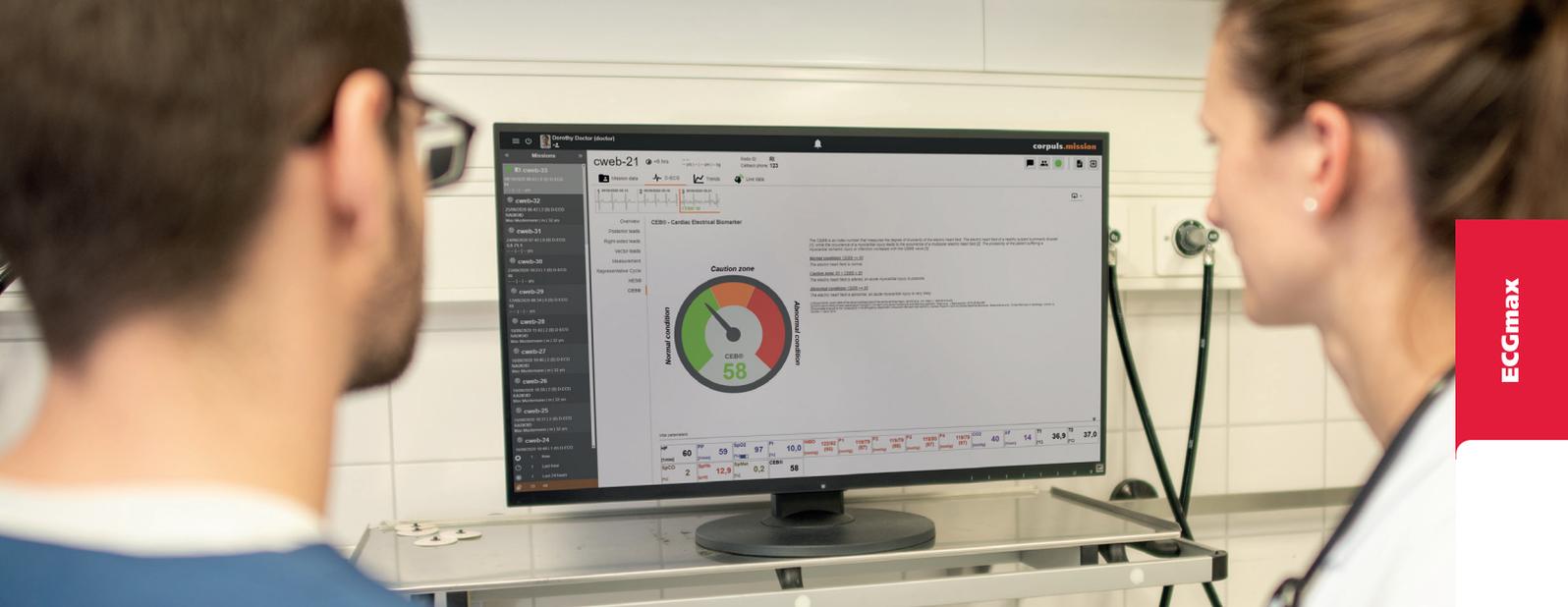
agreement. Both showed a high correlation in men ($R=0.857$) and women ($R=0.893$). This is important in order for the calculated ECG to then be used in determining the CEB®. Next, the diagnostic accuracies of sensitivity, specificity, positive and negative predictive values and probability coefficients were stratified by gender to form homogeneous groups. The ECG interpretation based on the CEB® proved to be equivalent or superior to the interpretations of the physicians – both individually and by consensus. The sensitivity of the CEB® was 93.3% in men and 90.5% in women, while the specificity was 90.7% and 92.5%, respectively. These values were even superior to the active control group.

IN SUMMARY...

... the CEB® demonstrated a high degree of diagnostic accuracy in the detection of acute myocardial infarction in men and women. This technology offers an efficient monitoring-based method that can be employed in emergency medicine to identify AMI in patients in real time.

Summary based on:

Schreck, David M.; Fishberg, Robert D. (2015): Detection of acute myocardial ischemic injury by gender using a novel cardiac electrical biomarker. In: The American journal of emergency medicine 33 (3), S. 383–390. DOI: 10.1016/j.ajem.2014.12.029.



STUDIES DEMONSTRATE A CORRELATION BETWEEN TROPONIN AND CEB®

INNOVATION IN MYOCARDIAL INFARCTION DIAGNOSTICS WITH THE CORPULS3

In the event of an acute myocardial infarction, early detection is crucial. Only then it is possible to treat it quickly, which clearly enhances the patient's chances of recovery and survival. Measurement of cardiac troponin is indicated for the diagnosis of an AMI. The diagnosis is confirmed if the value of this biomarker changes either during the initial measurement or the retesting 3 and 6 hours later.

In contrast to cardiac troponin, the CEB® cardiac electrical biomarker can be collected without needing to draw blood or process the sample in a lab. Instead, the CEB® can be calculated based on a 12-lead ECG with eigenvalue modelling and quantification from dipolar to multipolar forces.

To demonstrate the correlation between CEB® and high-sensitive troponin I (HsTnl), Tereshchenko et al. conducted an extensive investigation. 12-lead ECGs were run on 411 patients and troponin was measured upon admission to hospital and after 3, 6 and 9 hours. The CEB® was determined by using a Vectraplex ECG system (VectraCor, Totowa, NJ).

In a linear, mixed-effects regression analysis, statistically adjusted for the effects of age, ancestry and gender, rising troponin values were associated with significantly increasing CEB® values (95% Confidence Interval, 0.008–0.134; P = 0.027). A tenfold increase in troponin was associated with an 8.3% increase in CEB®.

A significant advantage of CEB® is the far easier quantification of myocardial damage by means of an ECG as opposed to blood concentration values. The user friendliness, modest cost, wide availability and continuous monitoring capability of ECGs in emergency medicine encouraged **corpuls** to offer CEB® immediately with the **corpuls3** as an optional solution for easy optimisation of myocardial infarction diagnostics.

IN SUMMARY...

... in examined patients with suspected acute myocardial infarction, a significant correlation was found between the measured level of troponin and the calculated CEB®. This explains why the change in CEB® can be attributed to the underlying damage to the myocardial tissue.

Summary based on:
 Tereshchenko, Larisa G.; Gatz, David; Feeny, Albert; Korley, Frederick K. (2014): Automated analysis of the 12-lead ECG in the emergency department. Association between high-sensitivity cardiac troponin I and the cardiac electrical biomarker. in: Critical Pathways in Cardiology 13(1), pp. 25–28. DOI: 10.1097/HPC.000000000000006.



corpuls 

CORPULS QUALITY CHEST COMPRESSION

With our individually customisable settings, children from 8 years of age can be treated as well as adult patients of all sizes with high-quality chest compressions.



corpuls cpr

corpuls cpr

corpuls cpr

THE POWERFUL ARM THAT SAVES LIVES

Like all **corpuls** innovations over the past 40 years, our foray into the mechanical chest compression market is, above all else, **UNIQUE**.

In designing the **corpuls cpr**, we focused on two things: the seamless rescue chain from pre-hospital, to air

rescue, through to the hospital, as well as keeping the hands-off period as short as possible. This is how we created a device with virtually unrivalled ergonomics and performance.

PROVEN IN CRASH TESTS

Every rescue mission involves a significant safety risk for rescue personnel. Previously, in order to transport a patient during resuscitation, a paramedic needed to remain standing in a moving vehicle while performing CPR. In the event of a sudden stop or an accident, serious injuries could result. The **corpuls cpr** not only performs higher quality chest compressions, it also enhances the safety of your rescue team. **corpuls cpr** even goes one step further: crash tests have shown that the **corpuls cpr** maintains its optimal positioning on the patient even after a 40 km/h impact.



► Run through a gauntlet of trials at the Trier University of Applied Sciences Test Institute for Vehicle Safety.

Watch the
crash test video:



SYSTEM SPECIFICATIONS

GENERAL SPECIFICATIONS

- Backlight **2.4" colour LED** display
- **SD™ card** for data transfer
- **Operating noise level:** approx. 70 dB
- **Operating temperature:** -20 °C to +45 °C
- **Dust and splash resistant** (IP54)
- Conforms with selected sections of the **RTCA DO 160G international aviation standard**

POWER SUPPLY

- **Magnetic plug**
- **12-33 V DC** (electrical system)
- **100-240 V AC** (mains power 50-60 Hz)
- **Battery charge time:** typically 90 minutes

TREATMENT PARAMETERS

- **Compression frequency:** 80 to 120 compr./min
- **Compression depth:** 2 to 6 cm
- **Therapy mode:** 30:2 | 15:2 | continuous

PATIENT PARAMETERS

- **Thorax height:** 14 to 34 cm
- **Thorax width:** no restrictions
- **Patient weight:** no restrictions

SYNCHRONISATION WITH THE CORPULS3

- Synchronised shock administration
- Remote control of the **corpuls cpr** via **corpuls3**
- Merge application data for debriefing



THE RIGHT BOARD FOR EVERY USE

All boards are made of carbon and are therefore **radiolucent** as standard. They are also very **easy to clean** thanks to their smooth surface.



QUADBOARD

- Specifically developed for **hospital use**
- Large handle for easy positioning under the patient



RECBOARD

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



SCOOPBOARD

- Ideal for **technically demanding missions with scoop stretcher**
- Compatible with all common scoop stretchers
- Attachment straps with magnetic buckle and fixation ring for secure fixation of the patient



SEAMLESS THERAPY – EVEN IN THE CATH LAB

The **corpuls cpr** with its variety of boards is specially manufactured with modern composite materials to make it as radiolucent as possible for use in the cath lab. The parts of the **corpuls cpr** arm, which for technical reasons cannot be radiolucent, are made as narrow as possible. This allows

the cath lab team to adjust the ray path to the ideal position for a clear view of the heart and the blood vessels. The **corpuls cpr** is so compact that even extreme movements of the C-arm are not blocked. Even in this case free access to the patient's thorax is retained.

INDIVIDUALISED THERAPY

The **corpuls cpr** arm is aligned above the patient and fixed in position with only one lever. The compression depth, which can be adjusted between 2 and 6 cm in 1-mm steps, and the compression frequency, which can be adjusted from 80 to 120 compressions per minute, allows individualised therapy, even with children.

The **corpuls cpr** with its intuitive operating concept is approved for children from the age of 8.



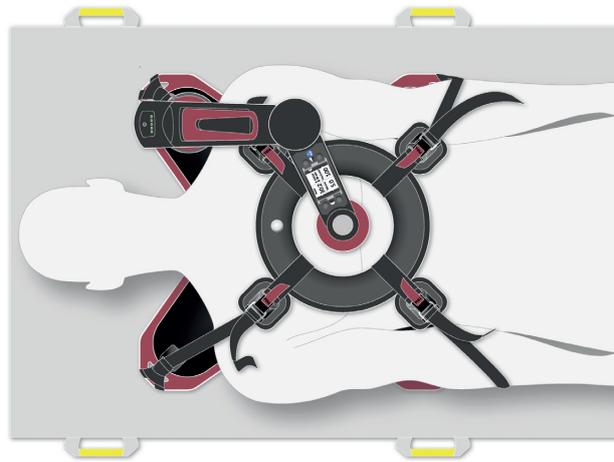
► Resuscitation of a patient on site.



ACCESS FROM ALL SIDES

Free access to the thorax is essential for treatment of a patient during resuscitation. The Recboard or the Quadboard can be placed in multiple positions beneath the patient. The lever is opened for alignment on the thorax. The user determines the position of the stamp. That is exactly the position at which manual compression is applied, i.e. the lower half of the sternum. The stamp position check helps the user find the proper neutral position to avoid generating unwanted leaning. When the light is green, the lever can be closed and the therapy started. During therapy the **corpuls cpr** monitors the position of the stamp at every ventilation pause or after 100 compressions in continuous mode. If the thorax has collapsed due to the preceding compressions, the **corpuls cpr** automatically corrects the distance between the stamp and the thorax. Thus ensuring that the set compression depth is always achieved.

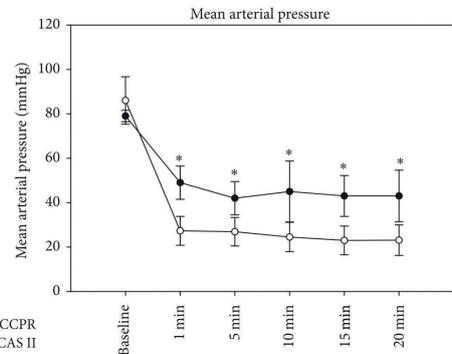
The patient can be transported with the **corpuls cpr** on different transport systems, if the patient is secured with a corresponding securing system. Make sure to leave the therapy zone uncovered.



► Use with Recboard Ring

EFFECTIVE – SCIENTIFICALLY TESTED

Studies have confirmed that the **corpuls cpr** meets the high standards of the **corpuls** brand. We conducted tests on both the mechanical thorax and animal models. We were able to show that the **corpuls cpr**, generates a significantly higher mean arterial pressure, a higher blood flow and thus a higher coronary perfusion pressure in direct comparison to a competitor device. We are also currently evaluating the performance of the device in practice with a follow-up study.



► The **corpuls cpr** generates a significantly higher MAP ($p < 0.05$) over the entire period of resuscitation.

Literature:

Eichhorn S, Spindler J, Polski M, Mendoza Garcia A, Schreiber U, Heller M, et al. Development and validation of an improved mechanical thorax for simulating cardiopulmonary resuscitation with adjustable 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.medengphy.2017.02.005. PubMed PMID: 28242180.

Eichhorn S, Mendoza Garcia A, Polski M, Spindler J, Stroh A, Heller M, et al. Corpuls cpr resuscitation device generates superior emulated flows and pressures than LUCAS II in a mechanical thorax model. *Australas Phys Eng Sci Med.* 2017. doi: 10.1007/s13246-017-0537-3. PubMed PMID: 28258484.

Eichhorn S, Mendoza A, Prinzing A, Stroh A, Xinghai L, Polski M, et al. Corpuls CPR Generates Higher Mean Arterial Pressure Than LUCAS II in a Pig Model of Cardiac Arrest. *Biomed Res Int.* 2017;2017:5470406. doi: 10.1155/2017/5470406. PubMed PMID: 29392137.





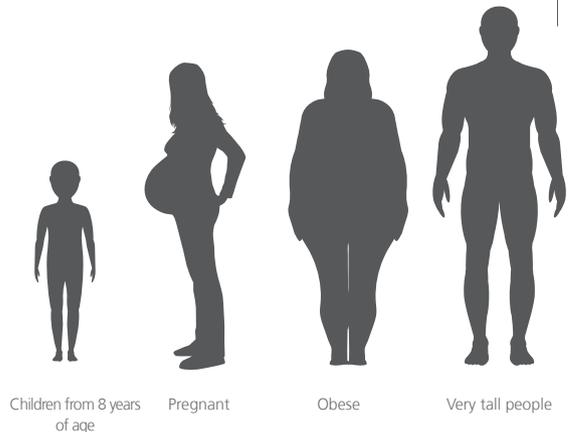
COMMUNICATION

To ensure the best possible follow-up of a mission, the **corpuls cpr** stores all relevant data to an SD card. The **corpuls cpr** can also be connected to the **corpuls3** by Bluetooth. This allows missions to be combined (matched) for use in a debriefing session. The data for the mechanical

resuscitation can also be displayed remotely in **corpuls.mission**. **corpuls.manager** can also be used for comprehensive and optimum debriefing after use and also for analysis of multiple completed missions.

SPECIAL FEATURES

- Children from the age of 8, pregnant women and obese patients can be treated
- Resuscitation in accordance with current valid guidelines
- Stress reduction due to safe, reliable use in often chaotic situations - leaving more time for other essential therapy measures
- Reusable stamps in two lengths
- No weight or size restrictions when treating patients





THE "FOURTH MODULE"

New from the all-rounder:
The **corpuls3** takes it a step further and
now works at the "heart" of the mission –
the patient's thorax.

corpuls **synchronisation**





synchronisation

synchronisation

PERFECT TEAMWORK

SYNCHRONISATION OF CORPULS3 AND CORPULS CPR

This has long been our vision: the perfect interaction between **corpuls3** and **corpuls cpr** during resuscitation. Our objective was to lift resuscitation procedures to a new level of quality. The **corpuls3** is primarily distinguished from other compact units by its revolutionary modular design. It can be divided into the monitoring unit, patient box and defibrillator/pacer. Synchronised therapy can greatly reduce the stress in the

team. **corpuls3** and **corpuls cpr** act as one unit, they are integrated into the team and the two of them working together make the resuscitation procedure even more efficient. The hands-off time is significantly reduced* and the patients' chance of survival is increased, even under very confined conditions.



corpuls3 SPECIFICATIONS

- **Weight:** only 6.5 kg (SLIM, basic equipment)
- Highly **dust and splash resistant** (IP55)
- **Operating environment:** -20°C to +55°C (basic functions: ECG monitoring, defibrillation)
- **DIN EN 1789**
- Selected sections of the **airborne transport RTCA DO 160 G** standard and the **US military standard MIL-STD-810 G**
- Transflective **8.4" display**, optionally with **touchscreen**
- **corpuls cpr** controlled via **Bluetooth**
- Integrated **4G modem** and **WLAN** or **LAN** port for **data transmission/telemedicine**
- **ECGmax** and **CEB®** – the 22-lead ECG solution by **corpuls**



* see the "Abstract Evaluation" section



We focused on two things in the design of the **corpuls cpr**: the seamless rescue chain from pre-hospital, to air rescue, through to the hospital, as well as keeping the hands-off period as short as possible.

This is why the **corpuls cpr** arm can be aligned above the patient and fixed in position in a few seconds with just one movement. During therapy the **corpuls cpr** monitors the position of the stamp at every ventilation pause or after 100 compressions in continuous mode. If the thorax has sunken the **corpuls cpr** automatically corrects the distance between the stamp and the thorax. Thus ensuring that the set compression depth is always achieved.

With three different boards of radiolucent carbon the user is fully equipped for any situation.

The synchronisation means that the **corpuls cpr** is virtually the fourth module of the **corpuls3** and we are again a step closer to our target of a seamless rescue chain.



Monitor



Patient Box



Defibrillator/
Pacer

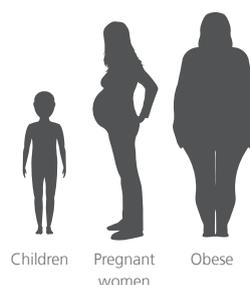
+



mechanical
chest compression

corpuls cpr SPECIFICATIONS

- **Weight:** 5.5 kg (arm with battery and stamp)
- **Compression depth:** 2–6 cm
- **Frequency:** 80–120/min
- **Therapy mode:** 30:2 | 15:2 | continuous
- **Bluetooth** and **NFC**
- **Intuitive user interface:** therapy start/stop button with alarm function and 4 softkeys
- **Customisable therapy parameters**
- **Battery running time:** up to 90 min
- **Radiolucent boards**
- **Fast secure adjustment**
- **Children from the age of 8, pregnant women and obese patients** can also be treated





CONNECT WITH 3 CLICKS

During synchronised therapy the **corpuls3** is more than simply the remote control for the **corpuls cpr** – although it can function as such. The **corpuls cpr** is much more with perfect integration into the AED and the manual mode of

the **corpuls3**. It enables the rescue team to treat the patient in accordance with current guideline recommendations. During treatment the **corpuls3** shows all the required information on the display.

- 

Connect button for connection with the **corpuls cpr** via Bluetooth
- 

Bluetooth icon indicates the Bluetooth connection to the **corpuls cpr**
- 

Pie chart with corpuls cpr as icon indicating a connection to the **corpuls cpr** and visualisation of the resuscitation cycle
- 

Start/Stop button for starting and stopping the mechanical chest compression of the **corpuls cpr**
- 

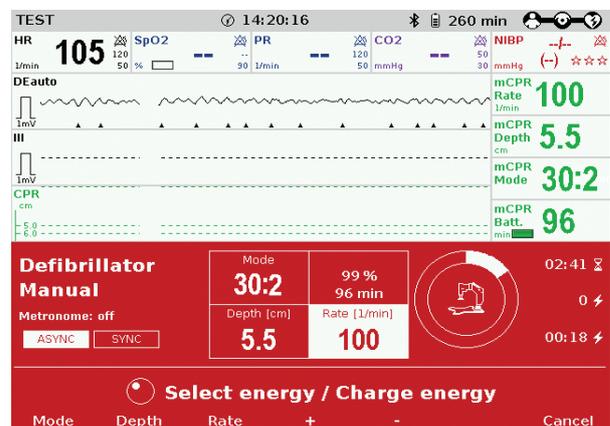
Resets the time in the pie chart if defibrillation was not used



COMPLETE CONTROL – ALL THE TIME

Once it has been connected it is no longer necessary to operate the **corpuls cpr** during resuscitation. The **corpuls cpr** is completely and automatically controlled by the **corpuls3**, regardless of whether AED or manual mode is in use. All therapy parameters

of the **corpuls cpr** can be checked on the monitor of the **corpuls3**. If you want to change the settings manually or stop or start the **corpuls cpr** this can also be done.



INTELLIGENT CONTROL WITH THE CORPULS3

The intelligent control of the **corpuls cpr** by the **corpuls3** during resuscitation follows the current guideline recommendations, depending on the mode (AED, manual ERC, manual AHA). In every mode the complete rhythm analysis is controlled

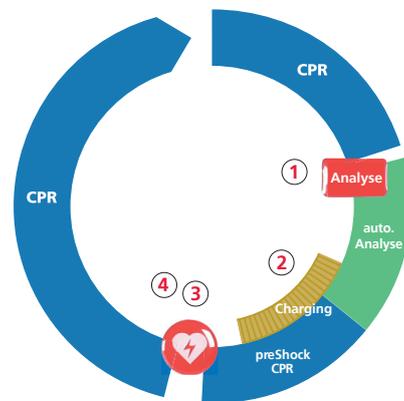
via the **corpuls3** as the central control unit. The user only needs to monitor that the stamp of the **corpuls cpr** is correctly positioned. All control commands for the user are transmitted wirelessly between the **corpuls3** and the **corpuls cpr**.

INITIAL SITUATION:

The **corpuls cpr** is positioned on the patient's thorax and applies chest compressions. There is a Bluetooth connection to a **corpuls3**.

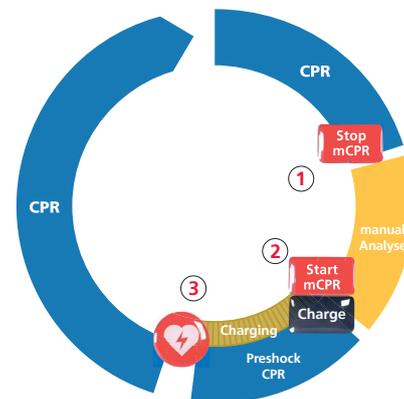
AED MODE

1. **Analysis button** interrupts **corpuls cpr** for the **AED analysis** and automatically restarts the therapy by the **corpuls cpr**.
2. **With a shockable rhythm** the defibrillator is charged and delivers an automatic **pre-shock CPR**.
3. **Shock button** interrupts the **corpuls cpr** for the shock delivery.
4. **In the case of a non-shockable rhythm** the **corpuls cpr** automatically continues the therapy.



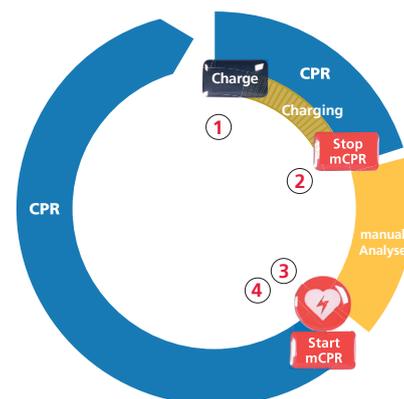
MANUAL 1 (procedure in accordance with ERC)

1. **Stop-mCPR button** on the **corpuls3** interrupts the **corpuls cpr** for the manual rhythm check.
2. **Start-mCPR button** continues the chest compressions/ pre-shock CPR.
3. **With a shockable rhythm** pressing the **Shock button** interrupts the **corpuls cpr** for the shock delivery. **In the case of a non-shockable rhythm** pressing the **Start-mCPR button** continues the **corpuls cpr** therapy.



MANUAL 2 (procedure in accordance with AHA)

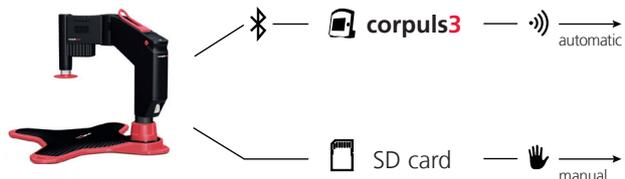
1. **Charge button** charges the defibrillator.
2. **Stop-mCPR button** on the **corpuls3** interrupts the **corpuls cpr** for the manual rhythm check.
3. **With a shockable rhythm** the **Shock button** is pressed.
4. **Start-mCPR button** continues the **corpuls cpr** therapy.





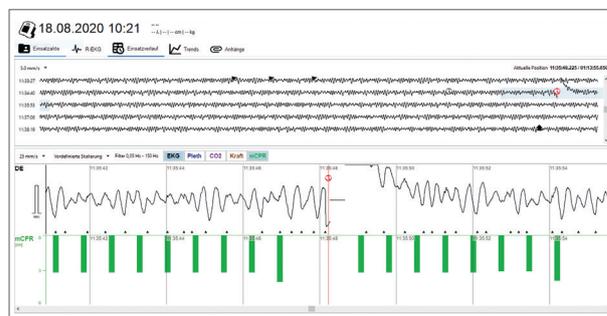
DATA IS ALWAYS VISIBLE

The combination with **corpuls.manager**, the management software solution for **corpuls** devices, makes the mission follow-up process easy.



corpuls cpr

Just a few clicks are needed to show all the curves of the **corpuls3** (e. g. ECG, CO₂ or IBD) along with the compression data of the **corpuls cpr** on a computer. This allows analysis of past missions and optimisation for future missions **corpuls.manager** can be used to generate an overall impression of one or more resuscitation missions in previously unobtainable detail and without any great effort. Users who already work with **corpuls.manager** or its predecessor **corpuls.web REVIEW** will not have to change their



corpuls.manager

- ▶ The **REVIEW** mode in **corpuls.manager** clearly shows that pressing the shock button automatically stops the **corpuls cpr**, the shock is delivered and then the CPR is then automatically continued.

working habits. The data from both devices are combined completely automatically in the **corpuls3** as soon as the unit is connected to the **corpuls cpr**. If the **corpuls3** connects to the **corpuls.manager** server via cellular connection or WLAN, the mission data can be automatically uploaded. Then in **corpuls.manager** you can filter the search for specific missions and run statistical analyses for useful insights.

BASED ON GUIDELINES

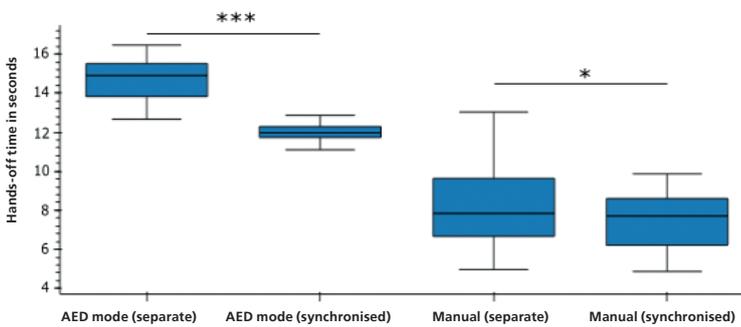
Guidelines are now an integral component of modern medicine. Consequently we have aligned our devices and the synchronisation between **corpuls3** and **corpuls cpr** based on the current guideline recommendations of Monsieurs et al. 2015. High Quality chest compressions improve the patient's survival prospects:

- Minimum **5 cm compression depth** (maximum 6 cm)
- Compression rate of **100–120 compressions/min**
- Thorax **completely recoils** between compressions
- After application of a defibrillator the **defibrillation should not be further delayed**
- **Chest compressions must be continued** while the defibrillator is being charged
- **< 10 s interruption** before and after shock delivery
- The chest compressions must be only **briefly interrupted**, even for attempted defibrillations
- **Chest compression devices** are recommended if sustained good manual compressions are not practical or the safety of rescuers is not assured
- A pre-shock pause of as little as 5–10 s already reduces the probability of a successful shock

ABSTRACT EVALUATION

The ERC guidelines recommend the minimisation of pauses during cardiopulmonary resuscitation. Chest compressions should not be interrupted for more than 10 seconds at the most before and after delivery of a shock. A peri-shock pause (the compression pause before and after defibrillation) of max. 10 s is scientifically confirmed to be associated with a higher survival rate (Cheskes et al. 2014; Sell et al. 2010). According to the ERC guidelines the complete process of manual

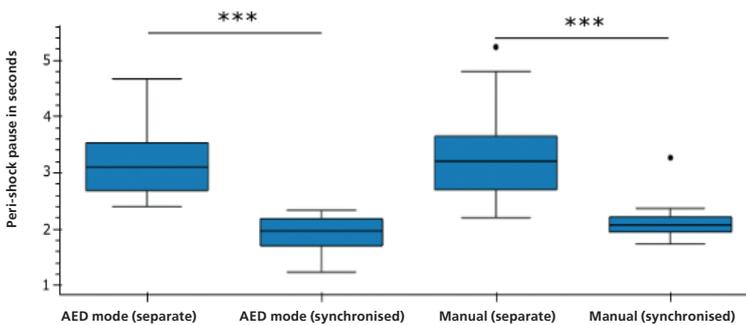
defibrillation should be performed with a compression pause of less than 5 s (Monsieurs et al. 2015). An internal company trial with the **corpuls3** in combination with the **corpuls cpr** showed pauses significantly shorter than the recommended limit. The synchronisation of the **corpuls3** and the **corpuls cpr** has been confirmed to improve this result even more. Synchronised operation of the devices has been able to achieve a reduction of the hands-off time by 16.08%.



► Figure 1: View of the hands-off time of our study comparing synchronised and separate operation of the **corpuls3** and **corpuls cpr**. (Significance $P < 0.001$: ***; $P < 0.05$: *)

The reduced compression pause was particularly significant with the peri-shock pause. On average the peri-shock pause of 2.00 ± 0.32 s in synchronised mode is 38.23% shorter

than the 3.24 ± 0.71 s peri-shock pause in non-synchronised mode. This time-saving along with a target pause of a total of 5 s can be very valuable.



► Figure 2: When comparing the peri-shock pauses, the significant minimisation of the pause duration when the **corpuls3** and **corpuls cpr** are synchronised compared with separate device operation is particularly significant. (Significance $P < 0.001$: ***)

Literature:

Cheskes, Sheldon; Schmicker, Robert H.; Verbeek, P. Richard; Salcido, David D.; Brown, Siobhan P.; Brooks, Steven et al. (2014): The impact of peri-shock pause on survival from out-of-hospital shockable cardiac arrest during the Resuscitation Outcomes Consortium PRIMED trial. In: Resuscitation 85, S. 336–342. DOI: 10.1016/j.resuscitation.2013.10.014.
 Kleinman, Monica E.; Brennan, Erin E.; Goldberger, Zachary D.; Swor, Robert A.; Terry, Mark; Bobrow, Bentley J. et al. (2015): Part 5. Adult Basic Life Support and Cardiopulmonary Resuscitation Quality. Circulation. 2015;132(suppl 2):S414–S435. In: Circulation 132 (18 suppl 2), S. S414–S435. DOI: 10.1161/CIR.0000000000000259.
 Monsieurs, Koenraad G.; Nolan, Jerry P.; Bossaert, Leo L.; Greif, Robert; Maconochie, Ian K.; Nikolaou, Nikolaos I. et al. (2015): European Resuscitation Council Guidelines for Resuscitation 2015: Section 1. Executive summary. Resuscitation 95 (2015) 1–80. In: Resuscitation 95, S. 1–80. DOI: 10.1016/j.resuscitation.2015.07.038.
 Nolan, Jerry P.; Soar, Jasmeet; Zideman, David A.; Biarent, Dominique; Bossaert, Leo L.; Deakin, Charles D. et al. (2010): European Resuscitation Council Guidelines for Resuscitation 2010. Section 1. Executive Summary. In: Resuscitation 81 (10), S. 1219–1276. DOI: 10.1016/j.resuscitation.2010.08.021.
 Perkins, Gavin D.; Olasveengen, Theresa M.; Maconochie, Ian; Soar, Jasmeet; Wyllie, Jonathan; Lockett, Robert Greif Andrew et al. (2017): ERC 2017 Guidelines Update. In: Resuscitation. DOI: 10.1016/j.resuscitation.2017.12.007.
 Sell, Rebecca E.; Samo, Renee; Lawrence, Brenna; Castillo, Edward M.; Fisher, Roger; Brainard, Criss et al. (2010): Minimizing pre- and post-defibrillation pauses increases the likelihood of return of spontaneous circulation (ROSC). In: Resuscitation 81 (7), S. 822–825. DOI: 10.1016/j.resuscitation.2010.03.013.





corpuls1

THE ULTRACOMPACT PATIENT MONITOR AND DEFIBRILLATOR

The **corpuls1** stands out not only for being light weight and easy to use, but for its ability to deliver the highest level medical performance. It is the ideal medical device for both the hospital and pre-clinical environment.

corpuls1

corpuls1



MAXIMUM MOBILITY, EASY TO OPERATE, QUICK DIAGNOSIS

Small, light and compact, but all the power of **corpuls3**, its big brother. The **corpuls1** is specially designed for the requirements of fire services, first responders, ambulance services, medical practices and catastrophe response. An extremely compact but fully functional defibrillator/patient monitor that is always ready for use, even if it lacks some of the size.

The greatest advantage: its low weight. The **corpuls1** weighs only 2.3 kg but it is still a fully functional patient monitor.

The transreflective 5.7" display shows optimal views of up to 3 curves and 4 vital parameters. As with the **corpuls3**, the intuitive user interface is simple to operate. ECG, heart rate and pulse oximetry (optional) are always visible.

Depending on the application, **corpuls1** can be used as an

automated external defibrillator (AED) or in the manual defibrillation mode. **corPatch CPR*** provides information about the quality of the manual resuscitation. The quality of the compression is shown in a bar chart. The quantitative quality is shown as compression frequency per minute. **corPatch CPR*** offers additional audiovisual support for a manual resuscitation.

In addition, the **corpuls1** can optionally be equipped with a transcutaneous pacer with the FIX/DEMAND modes for the treatment of cardiac arrhythmia.

SHOCK SPOONS AND SHOCK PADDLES

All **corPatch** therapy electrodes as well as the shock spoons and shock paddles are compatible with the **corpuls1**. For this reason the **corpuls1** is also ideally suited for use in the hospital environment, such as cardiac surgery or as a defibrillator on an ambulance. The **corpuls1** has a high-quality HV unit, which is also used in the **corpuls3**. This means that the **corpuls1** can also deliver a shock in case of a cardiac arrest.



► **corpuls1** with mounted shock-paddle holder.

corpuls1 SPECIFICATIONS

GENERAL SPECIFICATIONS

- **Dust and water splash protection**
in accordance with IP55
- **Vibration and impact-tested**
in accordance with DIN EN 1789
- **Alarm LED, speaker**
- **Audio recording**
- **Power supply** 12 V DC,
100 to 250 V AC with power supply unit
- **Weight:** 2.3 kg
- **Dimensions (WxHxD):**
26 cm x 17 cm x 7 cm (without bags)

DEVICE OPERATING TIME

- Factory setting **without power-saving mode:**
5 h 30 min
- Factory setting **inverted, lowest brightness setting:** 8 h 45 min
- Factory setting, **ECG and SpO₂ active:** 6 h 30 min
- Factory setting **without accessories connected:**
7 h 18 min

DATA MANAGEMENT

- **SD[®] memory card**

POTENTIAL NUMBER OF SHOCKS WITH FULLY CHARGED BATTERY

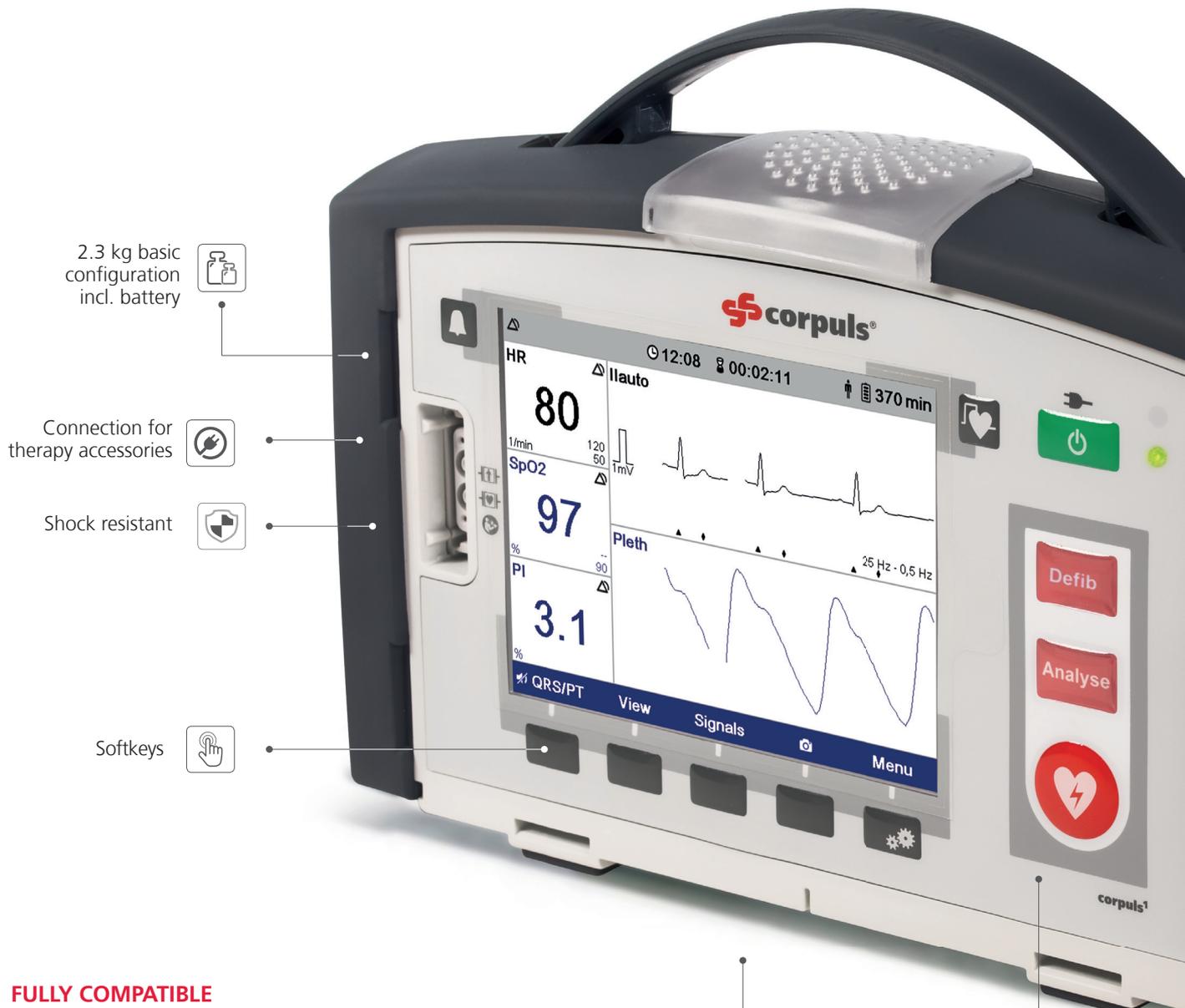
- **Minimum 200 shocks** at 200 J
- **Charging time of HV capacitor with fully charged battery:** approx. 5.5 s

PATIENT MONITORING

- **5.7" colour display,**
- **Up to 3 curves** and up to **4 vital parameters**
- **6-lead ECG**
- **corPatch CPR Feedback***
- **Masimo Rainbow SET[®]** for SpO₂, PP, PI
- **Masimo Rainbow SET[®]** (optional) SpCO, SpMet, SpHb

DEFIBRILLATOR/PACER

- **Automatic External Defibrillator (AED)**
- **Manual Defibrillator**
- **Synchronised Cardioversion**
- Pacer with **2 modes** (FIX, DEMAND)
(optional)



FULLY COMPATIBLE



During a mission, seconds make the difference. That is why we made sure that patient hand-over from the first responder for further care by the emergency services runs as fast and smooth as possible. As with all corpuls defibrillators, electrodes, sensors and cables of **corpuls1** can be used with the **corpuls3**.



Fully compatible with **corpuls3** accessories



Easy as 1-2-3 Operation

ACCESSORY FEATURES

- Batteries, sensors, **corPatch** therapy electrodes and cables are identical for fast patient hand-over
- Standardised user interface for **corpuls1** and **corpuls3** allows for intuitive handling
- Mission data from both systems can be transferred and evaluated in **corpuls.manager**



SD card slot



Oximetry



4-lead ECG



corPatch CPR
feedback*



Lithium-ion battery



ROBUST BAGS

Cables, sensors and accessories of the **corpuls1** can be stored in the side bags for protection and easy access. No more tedious connecting and disconnecting of the cables, as the cables come pre-connected in the bags. The **corPatch** therapy electrodes, already connected for immediate action, are stored in the magnetically closed front bag.

PULSE OXIMETRY



The integrated pulse oximeter (optional) enables monitoring of oxygen saturation, pulse frequency and plethysmography.

SpCO SCREENING



Our mission is not only to save the life of a patient – but we must also protect the emergency response teams. The **corpuls1** is optionally fitted with an SpCO measurement. It gives early warning of potential carboxyhemoglobin intoxication, for example for firefighters in action at a fire.

COMPLETE ENERGY MANAGEMENT



The powerful lithium-ion battery supplies the **corpuls1** with the necessary energy – for an extremely long time and even at -20 °C. In the display you always have a view of the remaining battery runtime in minutes or percent.





THE CORPULS AMONG AEDS

Paramedics, home carers, first responders, fire services and hospitals don't need much in the event of a resuscitation. But they must be able to rely 100% on their equipment:

An extremely reliable, independent and easily operated AED is now available – as a useful addition to the rescue chain – in the well-known **corpuls** quality.

corpuls aed



corpuls aed



MANOEUVRABLE, ROBUST AND INTUITIVE

The **corpuls aed** is an essential component of the rescue chain. It guides both professional and non-professional users reliably through the resuscitation process in accordance with the guidelines and is available in fully automatic and semi-automatic versions.

Emergency call button with hands-free function

Can be used to provide assistance from the dispatch centre when required and to alert other emergency services. It enables guided resuscitation via support from the dispatch centre or an emergency physician.

CPR-Feedback

The **corPatch CPR Feedback*** sensor is attached to the pressure point and measures compression frequency and depth. Depending on the configuration, the quality of the compressions is shown on the display and maintained at a constant level by voice prompts. The **corPatch** therapy electrodes and the **corPatch CPR*** sensor can be used on other **corpuls** devices.

Status display

The user can see at a glance that the device is ready for use.

Weather resistance

The high IP66 protection class means that the **corpuls aed** can be used in all weather conditions.



► Basic measures by first aiders increase the survival rate 2 to 3 times.



SPECIFICATIONS

- **Weight:** 1.9 kg (basic configuration, incl. battery)
- **Operating temperature:** -10 °C to +55 °C, CPR-only mode -20 °C to +55 °C
- **Dimensions:** 25.5 cm (H) × 21.0 cm (W) × 5.8 cm (D), without accessory bag and electrode compartment
- **Battery standby life:** 5 years at factory settings
- **Operating time in AED mode:** 4 h 50 min
- **Time from switch-on to energy delivery:** < 15 s
- **Battery life:** when fully charged > 200 shocks at 200 J possible
- **Operating time in CPR-only mode:** 15 h
- **Vibration and impact-tested** in accordance with DIN EN1789
- **Metronome** frequency between 100 and 120 beats per minute (configurable)
- **Electrodes** compatible with all **corpuls** units, including the **corPatch CPR Feedback** sensor*
- **Wall-mount EN 1789-tested**
Suitable for installation in emergency vehicles



► Illustration shows **corpuls aed** as semi-automatic version with emergency call button.

SPECIFICATIONS

- **Status transmission by SMS or WLAN**
Devices that are not connected over WLAN** send their status as coded SMS with information on battery and therapy electrodes, readiness for operation etc. This applies to units with and without emergency call button.
- **Protection IP66 – Dust and water splash proof**
 - Can be positioned outdoors without wall box
 - Easy to clean
 - Ideal for placement in moist/dusty areas
- **Compatibility**
The **corPatch easy** therapy electrodes of the **corpuls aed** can remain with the patient at hand-over to the ambulance service using **corpuls** units.
- **Language selection** in AED mode (up to 3 languages)
 - For areas with different cultures and languages
 - Ideal in public areas (airports, railway stations etc.)
 - Language can be switched during AED use

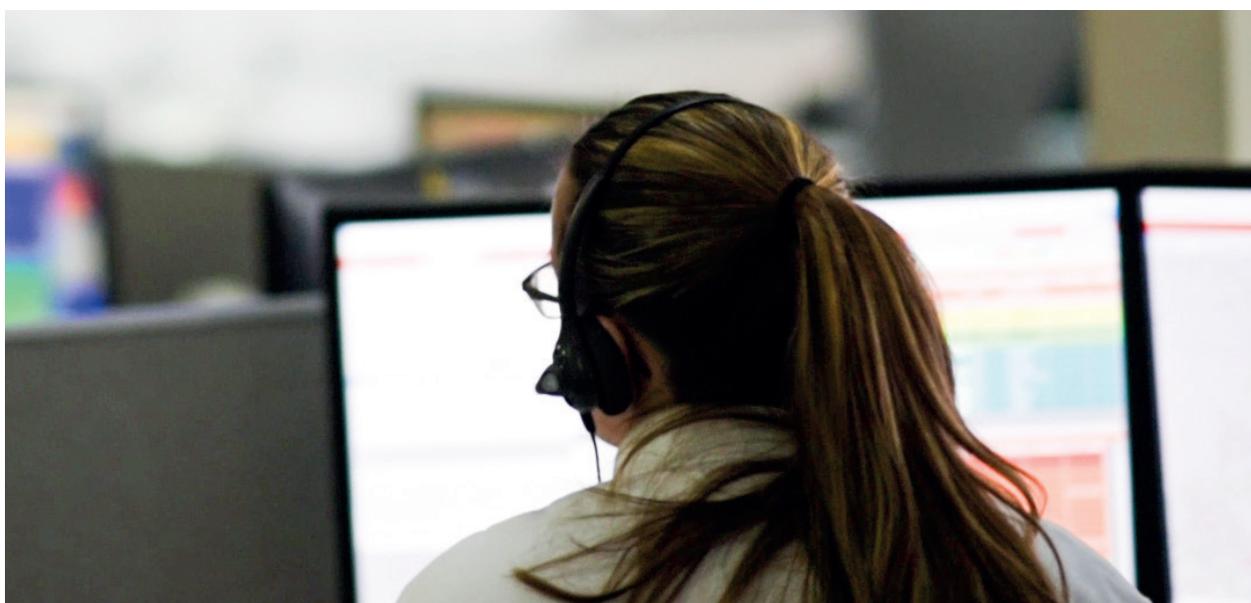
only with **corpuls.manager

SAFETY THROUGH TELEPHONE RESUSCITATION (T-CPR)

The survival rate of patients suffering from sudden cardiac arrest is greatly increased if witnesses to the emergency start basic first aid immediately.

First aiders will be more inclined to start resuscitation measures if there is support available to give instructions by telephone and to guide non-professionals through the resuscitation process.

After the introduction of the T-CPR the number of bystanders providing resuscitation increased by 12%. As a result T-CPR ensured faster first aid for the patient and significantly reduced the time before therapy was started.* The **corpuls aed** is now optionally supplied with a GSM module and hands-free system. Up to three telephone numbers can be saved in the unit.



► A mission controller guides first aiders until the arrival of the emergency services.

SPECIFICATIONS

- **GSM emergency call function** optionally available with up to three saved emergency telephone numbers
- **M2M card:** optional factory-installed M2M SIM card for GSM emergency call function for most European countries
- **Simple pictograms** for language-independent understanding of instructions
- **Voice output** clear and understandable

ACCESSORIES

- **Accessory bag:** Protective bag for **corpuls aed** with storage compartment
- **Rechargeable training battery** for Basic-Life-Support training
- **Emergency daypack:** emergency backpack for fast access to the **corpuls aed**



* L. Avalli et al: New treatment bundles improve survival in Out of Hospital Cardiac Arrest patients: a historical comparison

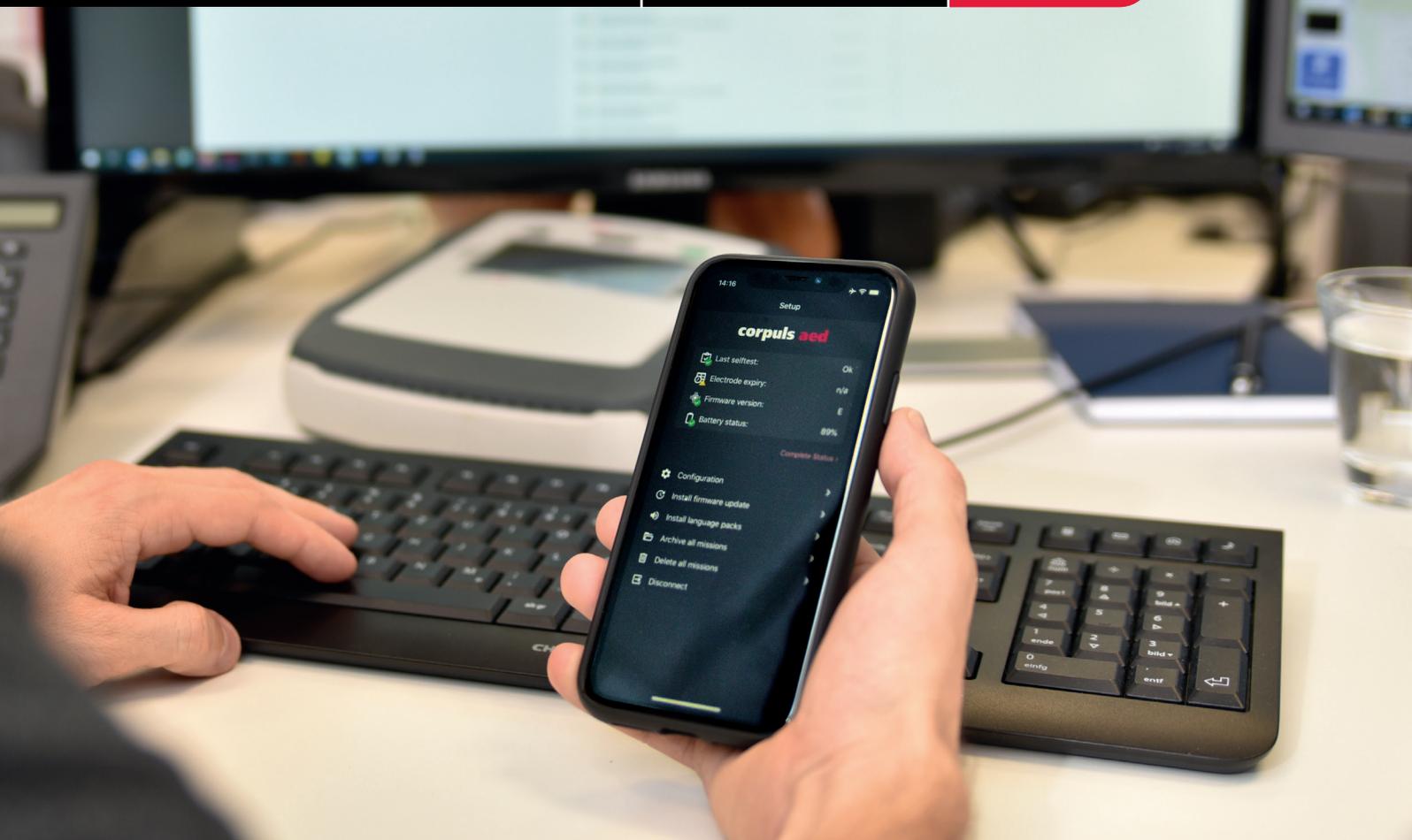


► If a WLAN is not available, self-test results can be sent by SMS

SMS STATUS MONITORING – ALWAYS AND ANYWHERE

The **corpuls aed** can send its status to **corpuls.manager ADMIN**. It is normally sent over a WLAN connection. In rural areas without WLAN access the status SMS supplements the monitoring of the **corpuls aed**. All important information such as remaining battery capacity, expiration date of the **corPatch** easy therapy electrodes and self-test results are sent to **corpuls.manager ADMIN**.

This information can be used to optimise the work flow of the service technician or device administrator. A new battery or therapy electrode can be installed as required. This feature is available for all device variations including those without an emergency call button. The SIM card required for this function is available directly from **corpuls**.



► Simple connection for configuration over WLAN from the smartphone.

DEVICE MANAGEMENT – MADE EASY



With **corpuls.manager ADMIN** you can always keep an eye on your **corpuls aed** at all times.

corpuls.manager ADMIN manages all your **corpuls aed** devices from a web interface and you can see the status and configuration of the various devices at a glance. Self-test and operating data are displayed along with battery status, as well as when the therapy electrodes require replacement or if a technical safety check is pending. In the worst case the **corpuls.manager** also reports immediately any device faults. Notifications by email are also possible. Additional details such as location data or other device information can also be saved.

Centrally controlled software updates

After the regular self-tests the devices automatically connect to the server. The current status in **corpuls.manag-**

er can be viewed in a web browser and devices that require immediate service can be identified without having to physically be with the device. Extended maintenance phases or service appointments for software updates are also a thing of past with **corpuls.manager**. All you need is WLAN access and **corpuls.manager**. You can send all software updates, language packs or configuration changes to single or selected devices simply by pressing a button. All data are of course always securely encrypted.

If WLAN is not available at the planned location of the **corpuls aed**, the self-test results can also be sent by SMS over the cellular network to **corpuls.manager** and displayed there.

SPECIFICATIONS

- **Central monitoring** of all devices via WLAN and SMS
- Detailed **status and self-test reports** for every device
- Transmission of **software updates/language packs** to any number of **corpuls aed** over-the-air via WLAN.
- **Upload configuration profiles** to definable device groups
- **Download operational data** – optionally with automatic transfer to **corpuls.manager ANALYSE**
- **Notification by email** of events

corpuls.manager

The **corpuls.manager** app connects to the **corpuls aed** by WLAN. This enables settings and parameters to be adjusted very quickly.

Three password-protected user levels

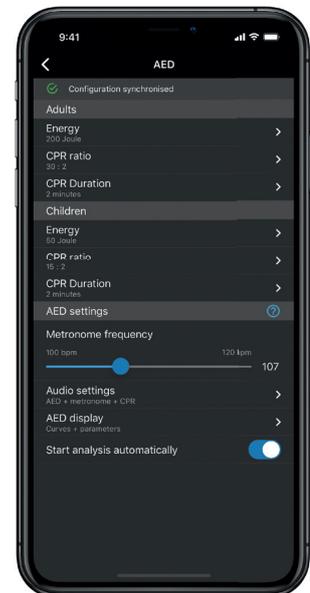
User, Operator and Service – every user has access to exactly the configuration options that are required. Do you need an update, a different language setting or do you want to check the software?

The **corpuls aed** can be perfectly adjusted for its purpose.

Export of mission data

The mission data of the **corpuls aed** can be exported and uploaded to a server. The data can be analysed **with corpuls.manager REVIEW**.

To download the **corpuls.manager** app:



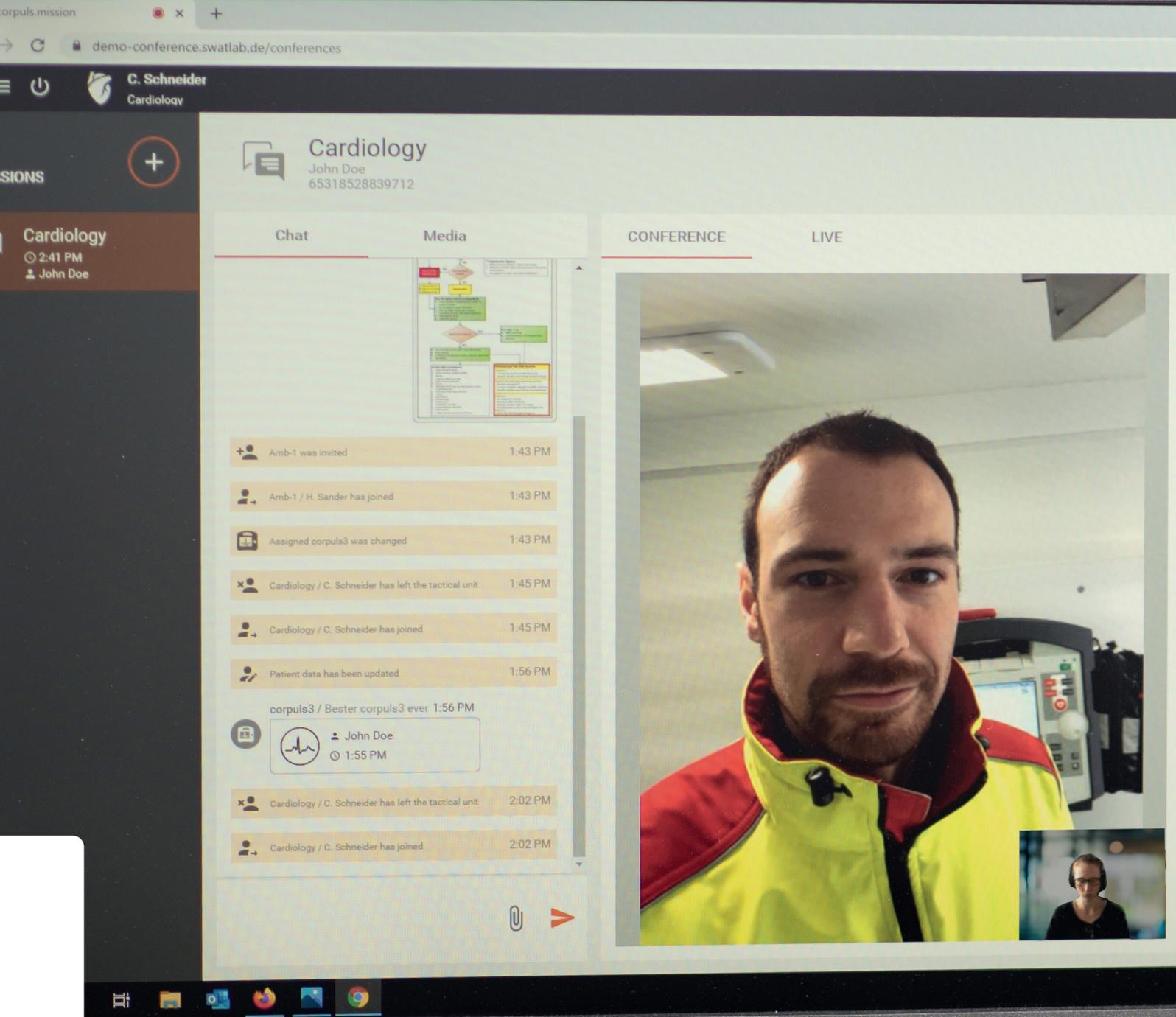
corpuls aed



► Fast and simple configuration on site.

FUNCTIONS

- **System check & status reports**
- **Configuration of parameters**
Adjustment of energy, mode, automation etc. (incl. loading and saving a configuration)
- **Install updates and language packs**
The required files are available via the app and do not need to be downloaded in a browser.
- **Upload mission data** to the server, including to **corpuls.manager ANALYSE**





corpuls.mission

mission

TELEMEDICINE REDEFINED

corpuls.mission is a comprehensive communications solution. Medical data in real-time, video chat, data exchange and mission documentation are available for all users during a mission – and beyond.

corpuls.mission

ONE MISSION – ONE SOLUTION

Corpuls.mission is a medical communication platform in which the patient is brought into the main focus. **corpuls** draws knowledge together where it is most urgently needed: during a mission.

Adequate patient treatment requires, above all, specific knowledge. However, the complexity of medicine cannot rest on the shoulders of a single specialist. By combining

medical data, chat, video and documentation, you will find all relevant information in one place. Designed for the special requirements of preclinical missions, **corpuls.mission** stands out from classic communication solutions. View diagnostic ECGs and photos of medication plans next to the live curves from the **corpuls3**. And all this with the usual **corpuls** quality and data protection "Made in Germany".

corpuls.mission LIVE



- **Smart telemedicine** with live connection
- **Vital parameters and curves** in real-time
- **Measurement and interpretation of the 12-lead diagnostic ECG**
- **Embedding of ECGmax:** 22 leads from 10 electrodes, vector loops and CEB® – can be used directly in the application
- **Automated forwarding** and flexible interfaces for export of data
- **Monitoring of multiple patients** and **visualization** of events

corpuls.mission CONFERENCE

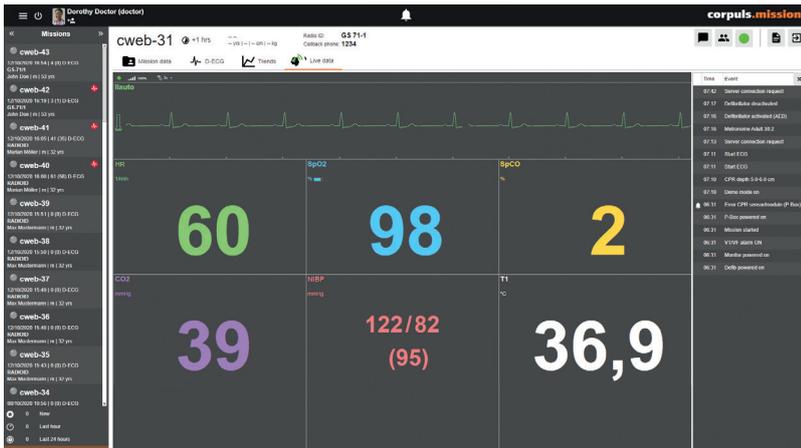


- **Patient-oriented communication**
- **Video chat:** live consultation by doctors or specialists via video and chat
- **Images, videos and voice messages**
- **Available for web, iOS and Android**
- **Tactical units** (e.g. dispatch centre, ambulance, crew) instead of individuals enable easy selection of the required communication partners

corpuls.mission REPORT



- **Collaborative case documentation**
- From the **anamnesis to handover**
- **One report from all participants** (e.g. ambulance and tele-physician)
- **Interfaces for archiving and data transmission**



► **corpuls.mission LIVE** shows in real-time the curves and vital parameters of the connected **corpuls3**. The application is web-based, enabling access from different locations and devices. This allows support by different experts.

▼ **corpuls.mission CONFERENCE** enables video conferences with any number of participants.



EVALUATION OF MEDICAL DATA – IN SECONDS BY SPECIALISTS



With **corpuls.mission LIVE** you can bring specialist knowledge directly to the mission site in fractions of a second, regardless of how far apart the mission site and the hospital are.

With **corpuls.mission LIVE**, the specialist in the clinic knows the patient status before the emergency transport even arrives in the emergency room. Through the interaction of the **corpuls3** and **corpuls.mission LIVE**, the doctor in the clinic can see all medical curves and parameters in real time while the rescue team is still with the patient. This enables early preparation in the clinic, tailored to the case. The curves and parameters measured are also recorded, meaning the specialist can also refer to the screen of the **corpuls3** from an earlier point in time. In addition, trends and events of the connected device are displayed and the **corpuls.mission LIVE Board** can also be used to monitor several devices and visualize events.

*The tele-physician can send instructions directly to the **corpuls3**. This is a particular advantage when sending instructions. They are stored in the application and can be viewed and printed out at the **corpuls3**.*



COMMUNICATION GOES BOTH WAYS

Communication via **corpuls.mission LIVE** is not a one-way street: instructions such as medication recommendations or the CEB® value can be sent directly to the rescue team via **webMessages**. That saves valuable resources. The basic requirement for **corpuls.mission LIVE** is provided by the **corpuls3** ex works on request: a cellular modem according to LTE 4G standard (with SIM card on request) and/or a WLAN interface.

corpuls.mission LIVE SPECIFICATIONS

- **Certified Medical Product**
- Transmission of **medical curves, vital signs** and the **12-lead resting ECG in real time**
- **Display, measurement and forwarding** of the **resting ECG in various formats** (e.g. PDF, SCP)
- **Embedding of ECGmax**: 22 leads from 10 electrodes, vectorloops and CEB® – can be used directly in the application
- **Browser based application**
- **Save valuable resources** with **early recommendations** and **interventions**
- **Flexible monitoring** of multiple patients
- **Recording of curves and vital signs** of the current mission
- **Communication** between paramedics and hospital
- **Separate transmission** of patient data and medical data to the server
- **End-to-end encryption** of patient data
- **Secure data transmission** at current TLS standards
- **Highest security standards** by the server host (ISO 27001)
- **Server failure safety 99.5%** (extendable)



► The tele-physician can view the situation on site at any time through real-time data – the data of the monitor are displayed immediately.



► All available leads of the resting ECG can be selected individually and viewed in detail. You can zoom in, change the feed speed and measure amplitude and duration. All data can be saved and commented with a finding. The same details are also included in exports and forwarding.



► The **Live Board** function enables simple monitoring of multiple patients and views can be selected as desired. You can display the real-time data of any number of **corpuls3** devices in tiles on multiple screens.



PATIENT-ORIENTED COMMUNICATIONS FOR FIRST RESPONDERS



CONFERENCE is a unique communications solution for rescuers. The underlying philosophy is revolutionary.

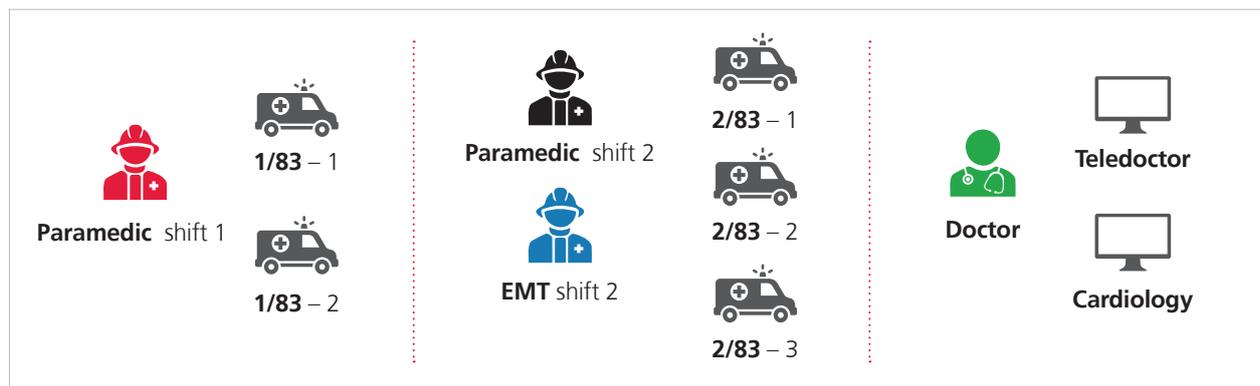
The on-site rescuer no longer contacts individuals when they need support, instead they contact tactical units. For example, instead of selecting the telephone number of Dr Smith in Cardiology at the City Hospital, they simply request a cardiologist via **corpuls.mission CONFERENCE**.

If necessary, further specialists will be added.

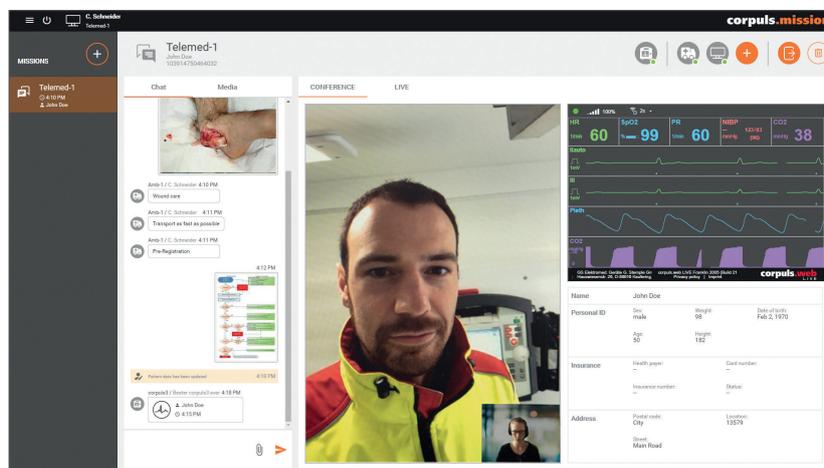
corpuls.mission CONFERENCE carries out optimal and patient-oriented live advice from doctors or specialists via videotelephony, audio calls and chat.

corpuls.mission CONFERENCE is the first, real communication solution for rescuers – rounded out by the ability to send pictures, videos, and voice messages.

corpuls.mission CONFERENCE functions at its best in combination with **corpuls.mission LIVE**. The tele-physician or the future attending doctor in the targeted hospital can analyse all vital parameters, ECG data and trends. In addition, the rescue team can exchange information via chat and video conference, transmit photos of medication plans,



▲ Every user can be assigned to one or more specific tactical units by the organisation. After login the user can select the available tactical units.



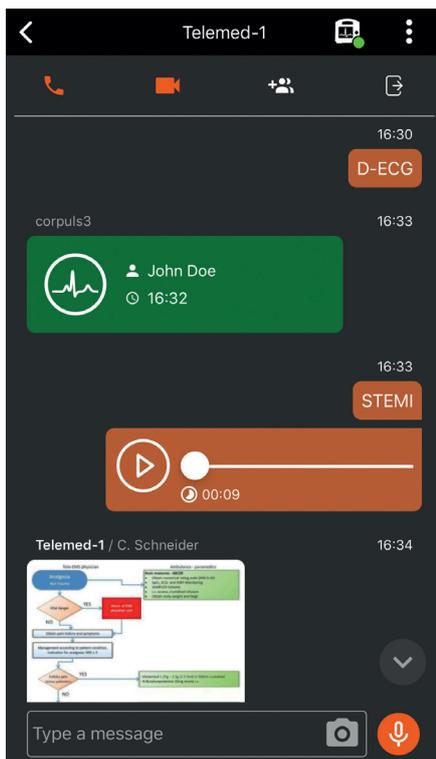
► The telemedicine doctor has a clearly laid-out application available: switch between cases, case progress, the video conference and on the side the master and real-time data of the patient.

wounds, send breathing sounds and much more. Before the patient arrives at the hospital, tailored treatment measures can be initiated by the rescue team and optimally prepared in the hospital. The connection between a **corpuls3** and

corpuls.mission CONFERENCE is extremely simple: Just scan the QR code attached to the patient monitor/defibrillator and the two devices will be automatically and clearly assigned to the same mission.

corpuls.mission CONFERENCE SPECIFICATIONS

- **Tactical units** (e.g. dispatch centre, ambulance, crew) instead of single persons enable easy selection of the required communication partners
- **Video chat:** live consultation by doctors or specialist via video telephony or chat
- **Send** images, videos and voice messages
- Available for **Web, iOS** and **Android**



- ▲ Resting ECGs, voice messages, pictures of the mission site and chat are completely visible at all times for all participants in the conference – even those who log in later.

To download the **corpuls.mission App**:



corpuls.mission

SUPPORTS RESCUERS WITH PATIENT TREATMENT –
HERE USING THE EXAMPLE OF A HEART ATTACK



1 The crew sends a regular resting ECG from **corpuls3** and automatically receives the CEB® (see pg. 23) as a web message from **corpuls.mission LIVE** within a few seconds. Making a fast and easy diagnosis possible.



CEB® AS WEB MESSAGE

VIDEO CONFERENCE

DOCUMENTS AS PHOTO



00:20



00:23

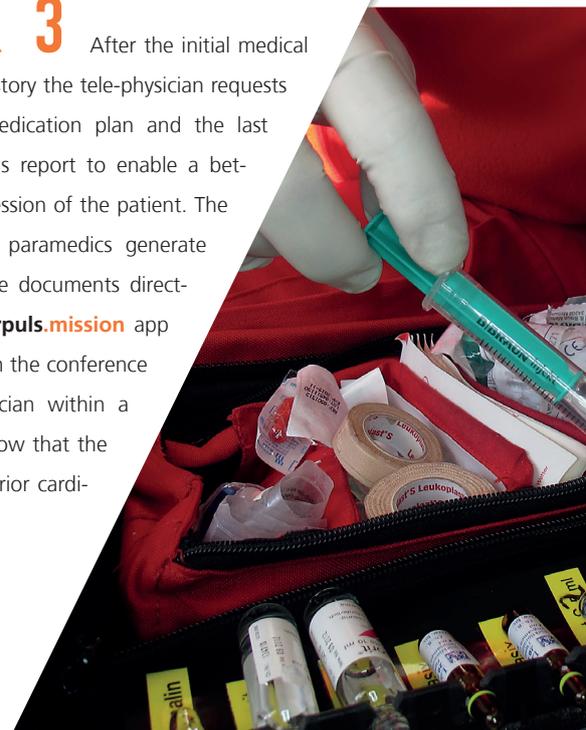
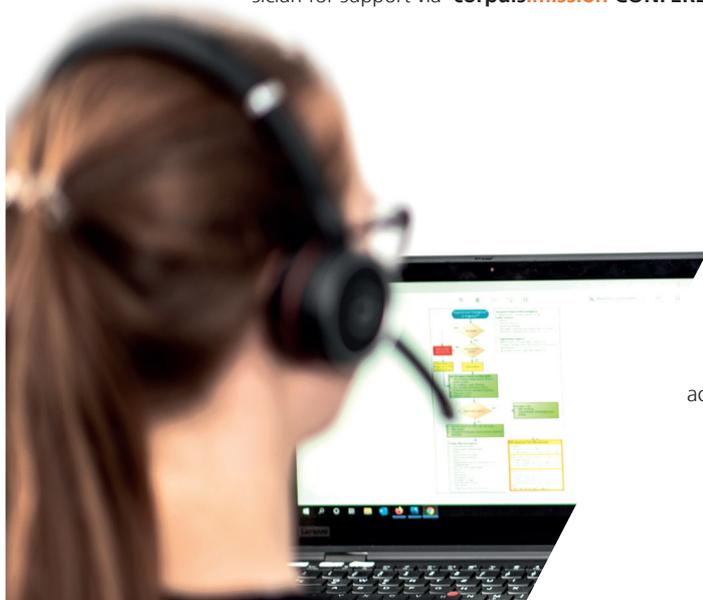


00:25

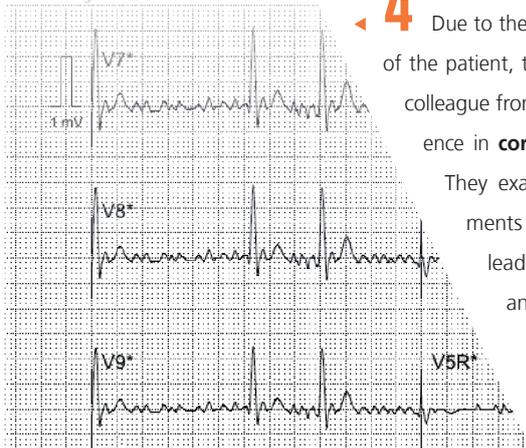


2 Due to the high CEB®, the unclear resting ECG and some other findings, the emergency paramedics are unsure and contact a tele-physician for support via **corpuls.mission CONFERENCE**.

3 After the initial medical history the tele-physician requests a medication plan and the last doctor's report to enable a better impression of the patient. The emergency paramedics generate photos of the documents directly from the **corpuls.mission** app and share them in the conference with the tele-physician within a few seconds. They show that the patient has significant prior cardiac problems.



AF - 1/min NIBD
 Geschwindigkeit 25,0 mm/s; Filter 0,05 Hz - 40



4 Due to the prior medical history of the patient, the tele-physician adds a colleague from cardiology to the conference in **corpuls.mission CONFERENCE**. They examine the findings and documents together. **ECGmax** with its 22 lead resting ECG, the vector loops and the CEB® offers a wide range of options for a holistic examination.

6 During the above processes the tele-physician has already determined a destination hospital for the ambulance with the appropriate level of care. The hospital receives the required information directly from **corpuls.mission CONFERENCE**. This information is given to the emergency paramedics in the conference. During transport the connection is maintained via **corpuls.mission LIVE** and the tele-physician

ECG EXAMINATION

88:28



MEDICATION INSTRUCTIONS

88:30



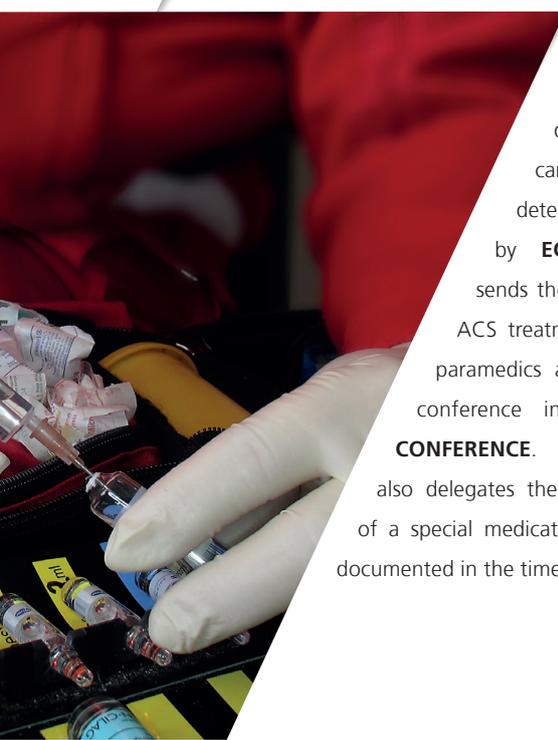
HOSPITAL ASSIGNMENT

88:38



5 After checking all the data, the cardiologist diagnoses an acute posterior myocardial infarction, which is easily detectable in the additional leads by **ECGmax**. The cardiologist sends the diagram of the SOP for ACS treatment to the emergency paramedics as an image via the conference in **corpuls.mission CONFERENCE**. The cardiologist also delegates the administration of a special medication, which is documented in the timeline.

tele-physician can observe the patient's vital parameters in real-time and ask questions via chat as required.

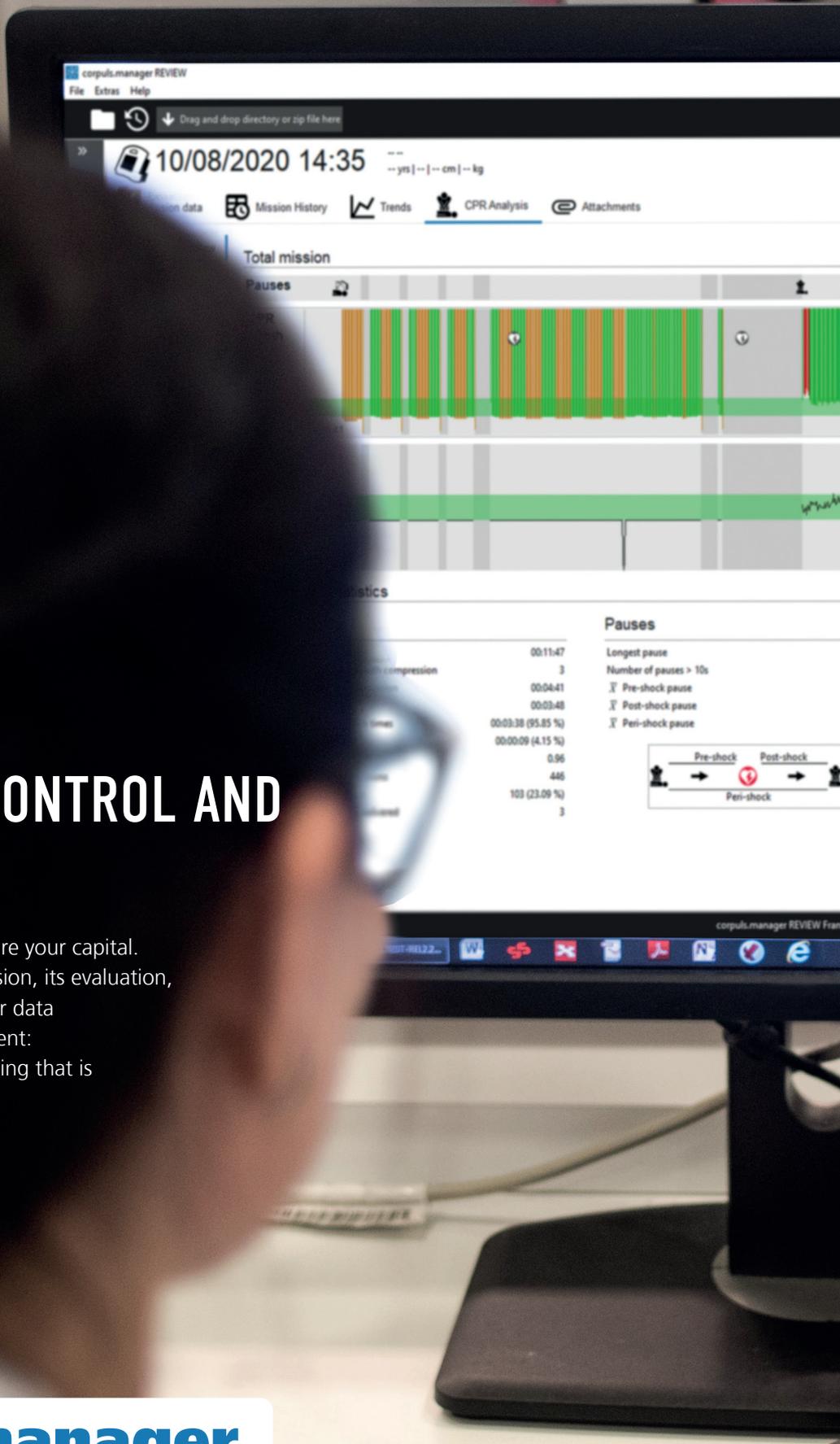


mission

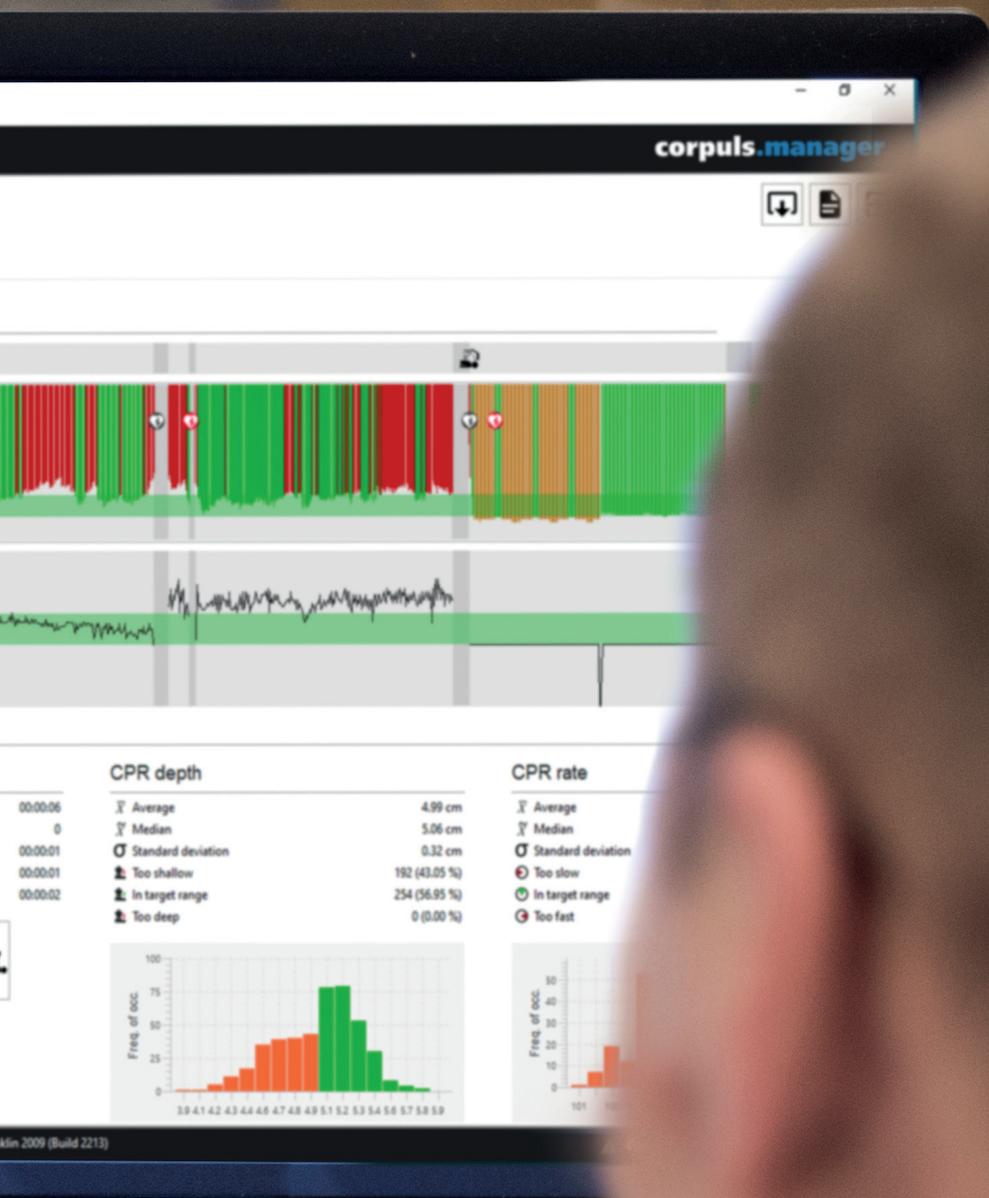
EFFICIENCY, CONTROL AND KNOWLEDGE.

Your missions and your devices are your capital. Whether the debriefing of a mission, its evaluation, statistics and visualization of your data or the intuitive device management: **corpuls.manager** offers everything that is necessary for data management.

corpuls.manager



corpuls.manager





corpuls.manager

ONE NEED – ONE SOLUTION

The mission does not end when the case is closed. The data collected helps you to continually improve. This benefits not only future patients but also the economics of your organisation. With **corpuls.manager** you bring

this 'loose' data together and obtain new knowledge from it. You retain the overview – and control of your data. Immerse yourself in the details of a single mission or see the overall picture of all missions.

corpuls.manager REVIEW



- **Debriefing** of missions
- **Detailed evaluation** of one mission
- View of all measured **curves and parameters**
- Evaluation of **training needs**

corpuls.manager ANALYSE

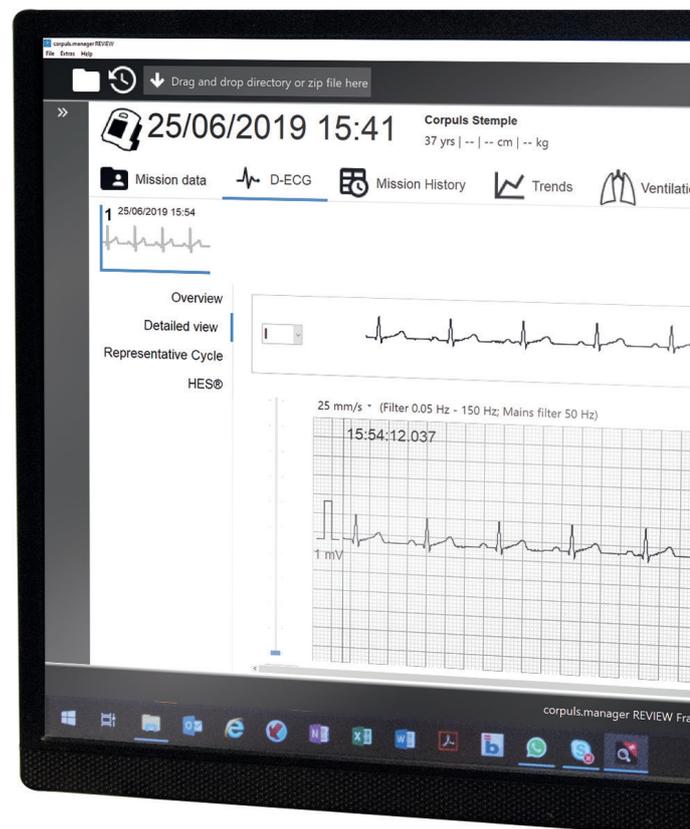


- **All mission data of all your corpuls devices** at one secure location
- New insights with **business intelligence**
- **Powerful search and filter functions**
- Organisation-wide **quality management**
- Support for **research and training**

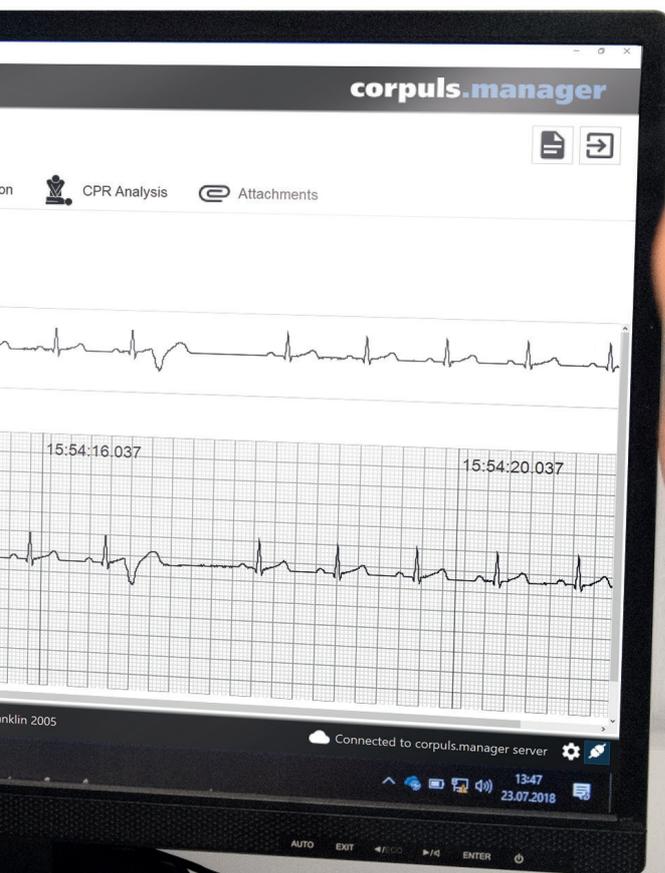
corpuls.manager ADMIN



- **Integrated device management** via **WLAN** or **SMS**
- **Over-the-air-updates**
- **Automatic status reports**
- **Notifications by email**



The automatic mission upload ensures that you always have the latest information available, prepared in clear-graphics and diagrams. AI support discloses new inter-connections and saves time with evaluation.



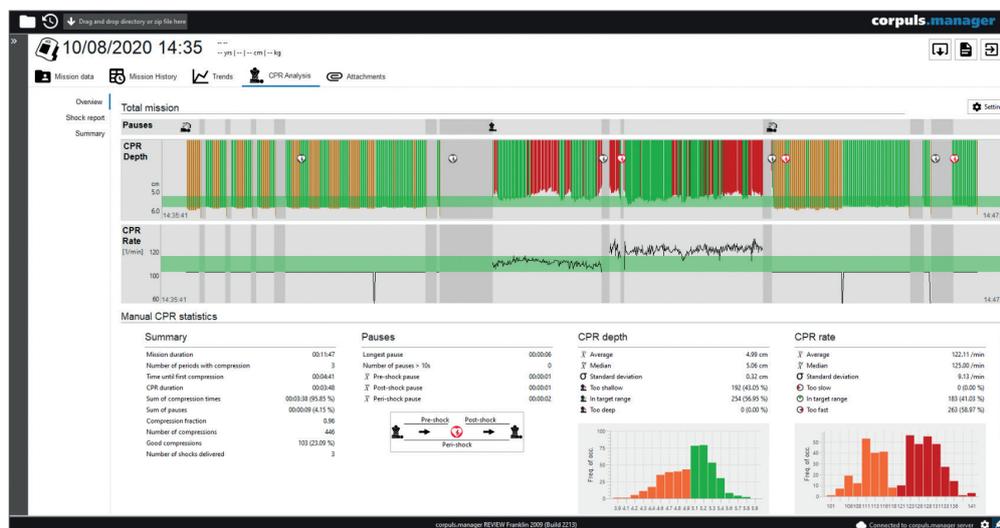
▲ Check the progress of the mission afterwards and evaluate potential improvements. The **corpuls.manager** tools provide detailed information on missions and devices and thus support preparation for future missions.



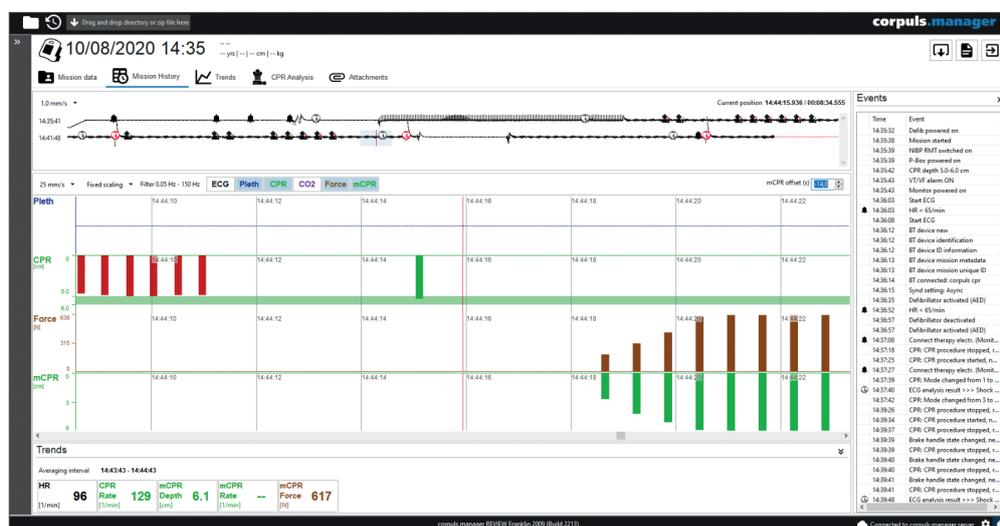
DEBRIEFING OF A MISSION

How did the team work during the mission? Did anything go wrong? Is any training required? The answers to these questions and more can be found in **corpuls.manager REVIEW**. It enables you to work through the mission second by second and identify potential weaknesses in the rescue chain. The optimal follow-up of a mission is as

crucial as its preparation. This is the only way of identifying weaknesses at an early stage and implementing appropriate training actions. It also uses data from the **corPatch CPR*** Feedback sensors and curves and vital parameters measured by **corpuls3**.



► The CPR analysis shows an exact evaluation of the cardiac compression. If **corpuls3** and **corpuls cpr** were connected by Bluetooth during the mission, you will receive a combined analysis of manual and mechanical resuscitation.



► The mission history shows an exact evaluation of all values and curves at any desired time. It can be navigated to the second and curves can be displayed and hidden. If **corpuls3** and **corpuls cpr** were connected by Bluetooth during the mission, the data from both devices will be stored in one mission file.

DERIVE KNOWLEDGE FROM MISSIONS



The data of all your missions in one place, filtered and analysed as required and also anonymised if necessary. **corpuls.manager ANALYSE** offers optimum management for large amounts of data. This server and data management solution provides you with the overall "big picture". All the data from your corpuls device fleet is automatically uploaded here and saved centrally. This gives you the opportunity to collect and analyse data from all missions. In addition to quality management, **corpuls.**

manager ANALYSE is an ideal tool for data acquisition for medical research projects.

A business intelligence solution is also available as an add-on for **corpuls.manager ANALYSE**. With 15 pre-configured dashboards, the mission data from an **ANALYSE** database can be graphically evaluated. Extensive and easy-to-use filter functions are available so that every user can answer individual questions and find specifics within the data.

► The **corpuls.manager ANALYSE** dashboards can be used to visualise all the data of your mission database. You can set a range of different filters to adjust the dynamic graphics to answer your questions.



Device ID	Software version	Device	Atta...	CO2	D.E...	Man...	Misc...	Sbs...	web...	Device mission ID	Duration	Test...	Mission start	Trage	LYFE mission ID	Age	Date of birth	Car
	REL-2.2.0_312_C3...									2014042061804	00:16:17		26/04/2014 08:18:04					
	REL-2.2.0_312_C3...									20140410145641	00:33:48		10/04/2014 16:56:41					
	REL-2.2.2_C3_BP									20140521124423	00:02:42		21/05/2014 13:44:23					
VAL 16	REL-2.2.1_C3_BP									20141020090129	01:21:10		20/10/2014 10:01:29					
	REL-2.0.3_C3_BP									20131001104956	00:11:07		01/10/2013 11:49:56			32	05/04/1981	379
AA	REL-2.2.1_C3_BV									20140420670810	00:01:39		28/04/2014 09:08:10					
DEMO-DEVICE	CI-1.0.11.0_35									20121201_214846...	00:16:25		01/12/2012 21:48:46			104	24/05/1908	
	CI-1.0.0_RCS									20130308_125219...	00:03:42		28/03/2013 12:52:19					
	CI-1.3.1.1_31									20150904_010007...	00:00:03		24/09/2015 01:00:07					
	CI-1.0.0_RCS									20130600_154558...	00:01:54		20/06/2013 15:45:58					
DEMO-DEVICE	CI-1.3.2.3_2									20151103_104933...	00:29:28		03/11/2015 10:48:33					
	CI-1.3.2.3_2									20151126_124003...	00:11:07		26/11/2015 12:40:03					
9	CI-1.1.1.1_31									20140625_100304...	00:02:37		25/06/2014 10:03:04					
	CI-1.2.0.0									20180814_204459...	00:11:51		14/08/2018 20:44:59					
VAL 13	CI-1.2.0.0_RCS									20171206_130418...	00:27:44		06/12/2017 13:04:18					
	CI-1.3.1.1_31									20150902_081214...	00:00:26		22/09/2015 08:12:14					

► The mission table shows the overview of all missions of your **corpuls** devices. You can apply a wide range of search and filter functions to find specific missions, which can then be viewed in detail.





INTERFACES

corpuls.mission and **corpuls.manager** offer a wide range of different interfaces and are open in many directions. This ensures that our products can be integrated into your systems.

HL7 FHIR

HL7 FHIR is a common protocol that provides a connection to third-party systems.

SCP

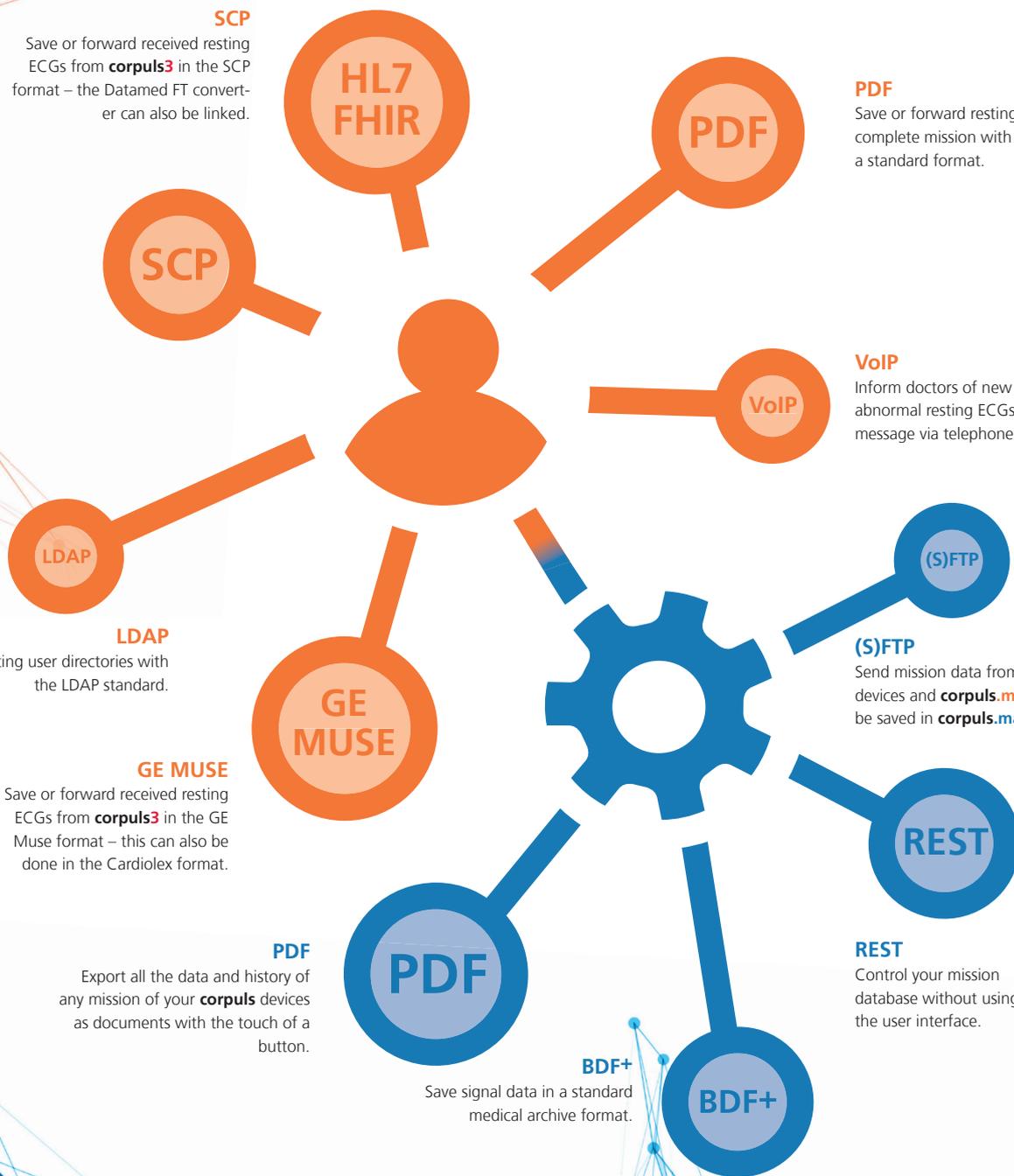
Save or forward received resting ECGs from **corpuls3** in the SCP format – the Datamed FT converter can also be linked.

PDF

Save or forward resting ECGs or the complete mission with all details in a standard format.

VoIP

Inform doctors of new missions or abnormal resting ECGs by voice message via telephone.



LDAP

LDAP
Link existing user directories with the LDAP standard.

GE MUSE

Save or forward received resting ECGs from **corpuls3** in the GE Muse format – this can also be done in the Cardiolex format.

PDF

Export all the data and history of any mission of your **corpuls** devices as documents with the touch of a button.

(S)FTP

Send mission data from **corpuls** devices and **corpuls.mission** to be saved in **corpuls.manager**.

REST

REST

Control your mission database without using the user interface.

PDF

BDF+

Save signal data in a standard medical archive format.

BDF+

DATA PROTECTION & DATA SECURITY

corpuls.mission



corpuls.manager

With **corpuls.mission** and **corpuls.manager** security is top priority. By encrypting all patient data, conformity with the strict data protection requirements is guaranteed. The servers are operated according to relevant standards, such as ISO 27001. In addition, the development of the entire product is subject to strict observation by an external control authority and is in compliance with the latest standards for IT security. All products conform to the specifications of the General Data Protection Regulation (GDPR)

and are developed in accordance with the specifications valid for the European Union. For example, the patients' right of access to stored information can be satisfied with a mission report. Deletion processes in the products assure the right to erasure.

A concept for rights and roles ensures that the products can be adapted for the users and that every user can only see what is permitted for that specific role.

INFO ON DATA PROTECTION & DATA SECURITY

corpuls is very aware of the significance of handling very sensitive personal medical data. This distinguishes us from classic consumer chat and video tools and public cloud storage.

- Secure cloud product (hosted in Germany or EU)
- Secure operation of servers in accordance with the latest standards
- Data processing contracts (no third-party accesses)
- Secure data transmission at current TLS standards
- Encrypted transmission – only known cipher suites conforming to official guidelines are trusted
- Complete encryption of all patient data
- All communications – audio, video, text – in **corpuls.mission CONFERENCE** are transmitted exclusively in encrypted form
- **corpuls.mission LIVE:** separate transmission of patient data and medical data to the server and end-to-end encryption of the patient data
- **corpuls.mission:** no data stored in the app or the browser
- **corpuls.manager:** Anonymisation rules ensure that everyone sees only the data authorised for that specific role or for example during data export patient data are not displayed – or a partial dataset is always deleted before being saved.





High-quality CPR

High Quality CPR

THE SMALLEST PATIENTS AND GREATEST QUALITY

Mediocre is not enough: just as patients cannot "survive a little bit", medical technology should not be satisfied with "a little bit of CPR quality." For **corpuls** this means: being perfectly prepared for every special situation and every special patient with special solutions and devices.

High-quality
CPR



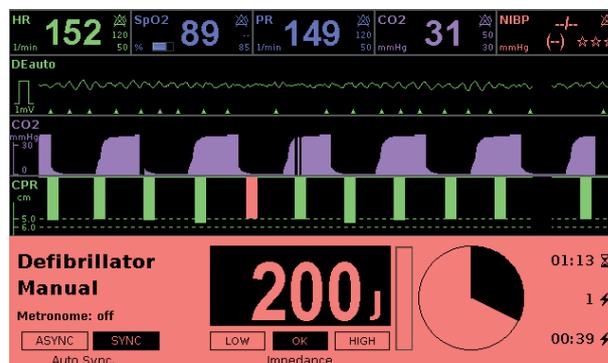
FROM CHILDREN TO AIR RESCUE: HIGHEST LEVEL CPR FOR EVERYONE, ANYWHERE

corpuls offers innovative therapy support at a high level of quality – for patients of all sizes and any age

corpuls concentrates on more than simply technical excellence. Every product is closely analysed for how it can help the user implement high-quality resuscitation, and in particular how it can support users with the treatment of children.

MISSION HIGH-QUALITY CPR

Starting high-quality resuscitation quickly is a decisive factor if the life of a cardiac arrest patient is to be saved. The user can administer the first shock promptly and quickly with the clearly structured menu guidance in defibrillation mode. As the process is continued the pie chart shows the progress of the cycle at every point. A reminder or automatic start of the ECG analysis can also be implemented at the final cycle.



► Visual feedback during thorax compression on the corpuls3.

Support of compression quality

- **CPR Feedback** with display of compression depth and frequency
- Configurable **audible output** of the feedback for the thorax compression
- Adjustable **smartMetronome** for setting the compression frequency and ventilation pauses
- Continuous view of the **etCO₂**

Minimisation of hands-off times

- Instructions for **pre-shock CPR**
- Shock synchronisation between **corpuls cpr** and **corpuls3**

- Continuous compressions by **corpuls cpr** are available even in difficult situations such as during travel or in flight

Post-resuscitation treatment

- Diagnostic ECG with **automatic ECG interpretation**
- Cardioversion and external pacer for treatment of cardiac arrhythmia
- **Telemedicine support** for selection of the best destination hospital

MISSION TREATMENT OF PAEDIATRIC PATIENTS

In order to improve the treatment of children, the **corpuls** team took part in a combined research project to study the automated intelligent resuscitation of children.

Sensors

For many years all **corpuls** sensors have also been available in child sizes. Non-invasive blood-pressure measurement is possible with adjustable cuffs from infants with an arm diameter of 8 cm to adults with arm diameters of 55 cm. Sensors for measuring oxygen saturation are available even for newborns of less than 3 kg body weight. In particular, when it comes to the demanding monitoring of a child with an unstable circulatory system, the user can rely on the neonate adapter for reliable measurement of end-tidal CO₂ even in newborns.

Defibrillation

The **corPatch paediatric** therapy electrodes are available for defibrillation of children. The automatic detection restricts the defibrillation energy to 100 joules during use. The energy is reduced to one tenth of the normal level when the baby electrode set is used. In addition to limiting the energy to prevent accidental injury due to excessive energy levels, the user can adjust the **defibrillation energy** in

small steps depending on the weight of the patient both in **AED** and also in **manual defibrillation mode**.

corpuls cpr

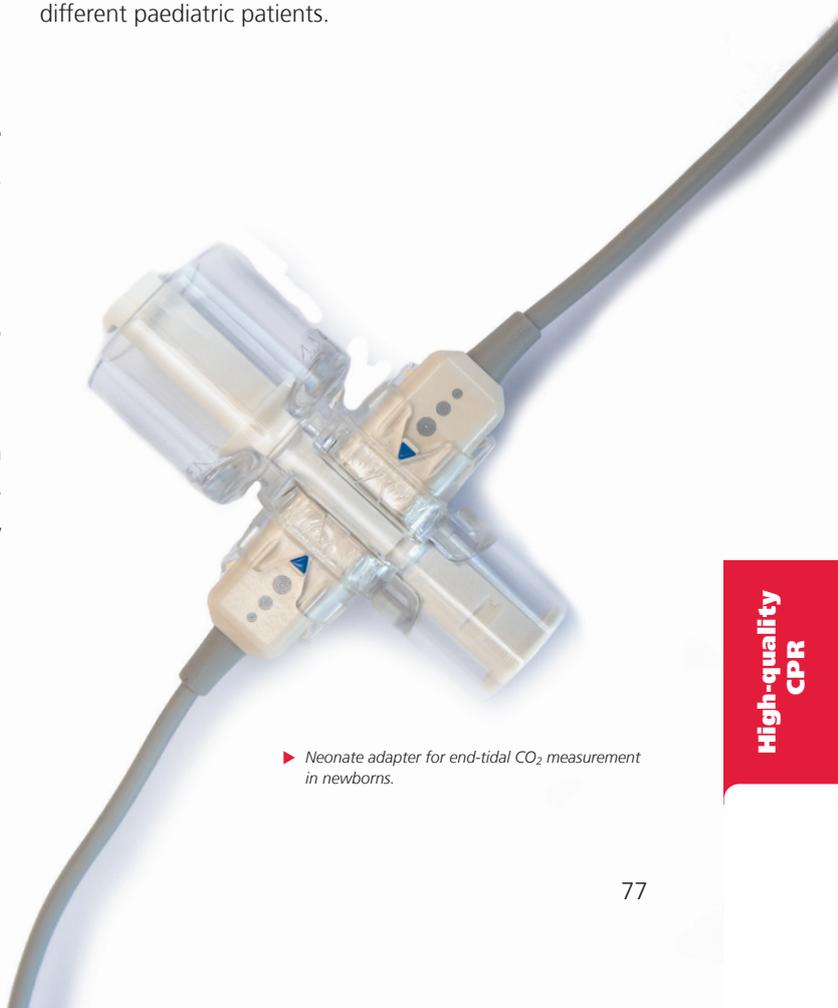
The **corpuls cpr** was the first mechanical compression device in the world approved for the treatment of children. Its flexibility makes it easy to adjust the device for the body of a child. In addition, the precise adjustment of the therapy parameters and the use of the paediatric compression-ventilation ratio of 15:2 enable customised therapy for different paediatric patients.

Literature:

Monsieurs KG, Nolan JP, Bossaert LL, Greif R, Maconochie IK, Nikolaou NI, et al. European Resuscitation Council Guidelines for Resuscitation 2015: Section 1. Executive summary. *Resuscitation* 95 (2015) 1–80. [doi: 10.1016/j.resuscitation.2015.07.038](https://doi.org/10.1016/j.resuscitation.2015.07.038). PubMed PMID: 26477410.

Sandroni C, Santis P de, D'Arrigo S. Capnography during cardiac arrest. *Resuscitation*. 2018;132:73–7. [doi: 10.1016/j.resuscitation.2018.08.018](https://doi.org/10.1016/j.resuscitation.2018.08.018). PubMed PMID: 30142399.

▶ Neonate adapter for end-tidal CO₂ measurement in newborns.



TRAIN HOW YOU FIGHT FOR LIVES

corpuls simulation brings training scenarios even closer to real life. The simulator looks, feels and functions virtually the same as a genuine **corpuls** defibrillator. Even in real terrain. **corpuls simulation** also comes with its own ecosystem.

corpuls simulation

Simulation





corpuls **simulation**

REALITY. SIMULATED.

IF YOU WANT TO BE AMONG THE BEST, YOU NEED THE BEST TRAINING.

The new generation in mission simulation

Often, there are worlds between theoretical scenarios and real missions which involve human lives. **corpuls simulation** brings absolutely realistic scenarios into your training. Just as pilots in flight simulators are suddenly con-

fronted with complications, rescuers must overcome unforeseen situations when training with **corpuls simulation**.

The result is a team perfectly prepared for any scenario and significantly improved treatment quality for the patient.



SPECIFICATIONS

COMPONENTS

- High quality hard case
- Accessory bags on the device (left, right, rear side)
- Transport bag with shoulder strap
- Monitoring ECG cable (ERC/AHA)
- Diagnostic ECG cable (ERC/AHA)
- SpO₂ sensor
- **corpuls** NIBP cuff (with hose) in various sizes
- etCO₂ sensor
- CPR feedback sensor
- Power bank
- Master cable for **corPatch simulation** training electrodes

- Reusable **corPatch simulation** training electrodes (adult/pediatric)
- WLAN access point and Bluetooth gateway (single-board computer)
- USB multi-charger
- Colour coded case for Instructor iPad

DIMENSIONS

- With accessory bags (left, right, rear side): 540 mm x 300 mm x 200 mm (W x H x D)

WEIGHT

- Device with Apple iPad Pro and Instructor iPad in transport bag with shoulder strap: 6.4 kg
- Device with Apple iPad Pro and Instructor iPad: 5.0 kg

RUN TIME

- Approx. 10 hours plus power bank



More at www.corpuls.world

THE SIMULATOR

An Apple iPad Pro in a deceptively real **corpuls3** housing is the heart of **corpuls simulation**. In the side pockets there is space for the original cables and sensors. Thanks to the power bank and integrated WLAN access point as well as Bluetooth gateway **corpuls simulation** is completely self sufficient. You only have to switch on **corpuls simulation** – all further configurations for WLAN and Bluetooth are done by the device after one-time setup itself.



12.9" iPad Pro as Touchscreen



Onboard WLAN access point and Bluetooth gateway



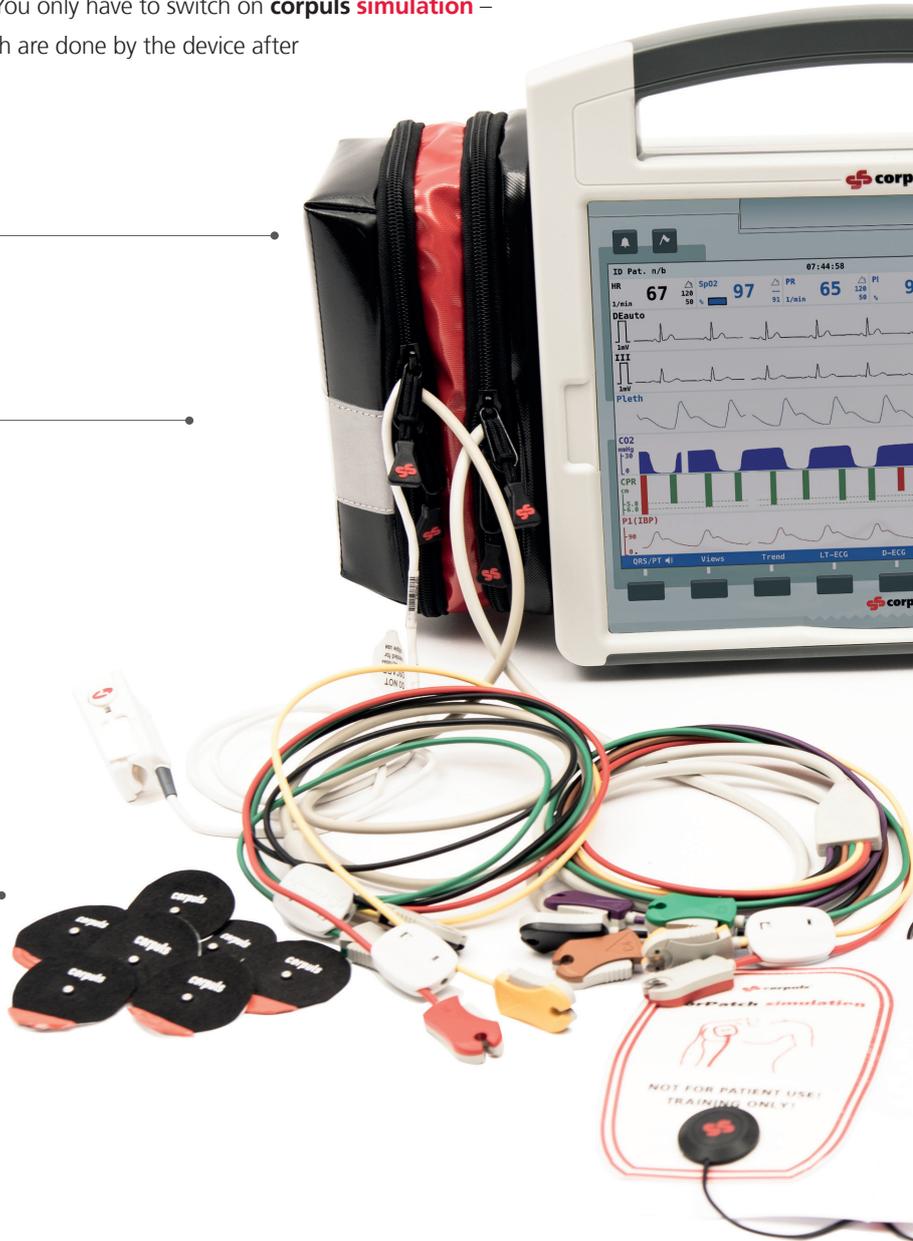
User interface for:

- corpuls3 CLASSIC
- corpuls3 TOUCH
- corpuls1
- corpuls aed



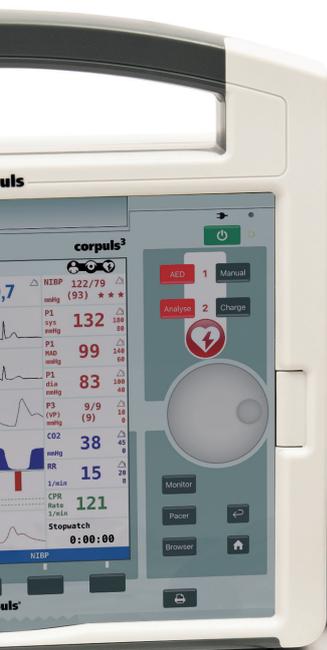
Extensive accessories:

- Reusable simulation electrodes
- True-to-original sensors and cuffs
- and much more



THE FACTS

- All the functions of the original device
- Realistic parameters and curves
- Status changes through events
- Scenario editor
- Simulation consumables
- Original accessories
- The latest device software for the specific medical devices
- Multiple languages available
- Safe training
- corpuls simulation community
- Bluetooth connection to corpuls cpr



USB multi-charger



True-to-original **corpuls3** bags for accessories



corpuls simulation transport bag



Instructor iPad according to kit configuration



Up to date

Every new software version of a device brings changes. In order to prepare rescuers in the best possible way for these changes, new software versions of the **corpuls** defibrillators are also published for **corpuls simulation**. Thus your team is already familiar with the new software before it is installed on your real **corpuls** defibrillator.

► Via the intuitive interface, current scenarios can be modified at any time.



IT'S HERE: THE SHOP

I am no hero – It's my Shop: Due to popular demand, corpuls is also now available to wear, write, BBQ, eat & drink. For the office, hobby, mission and much more.

Discover now at www.corpuls.shop