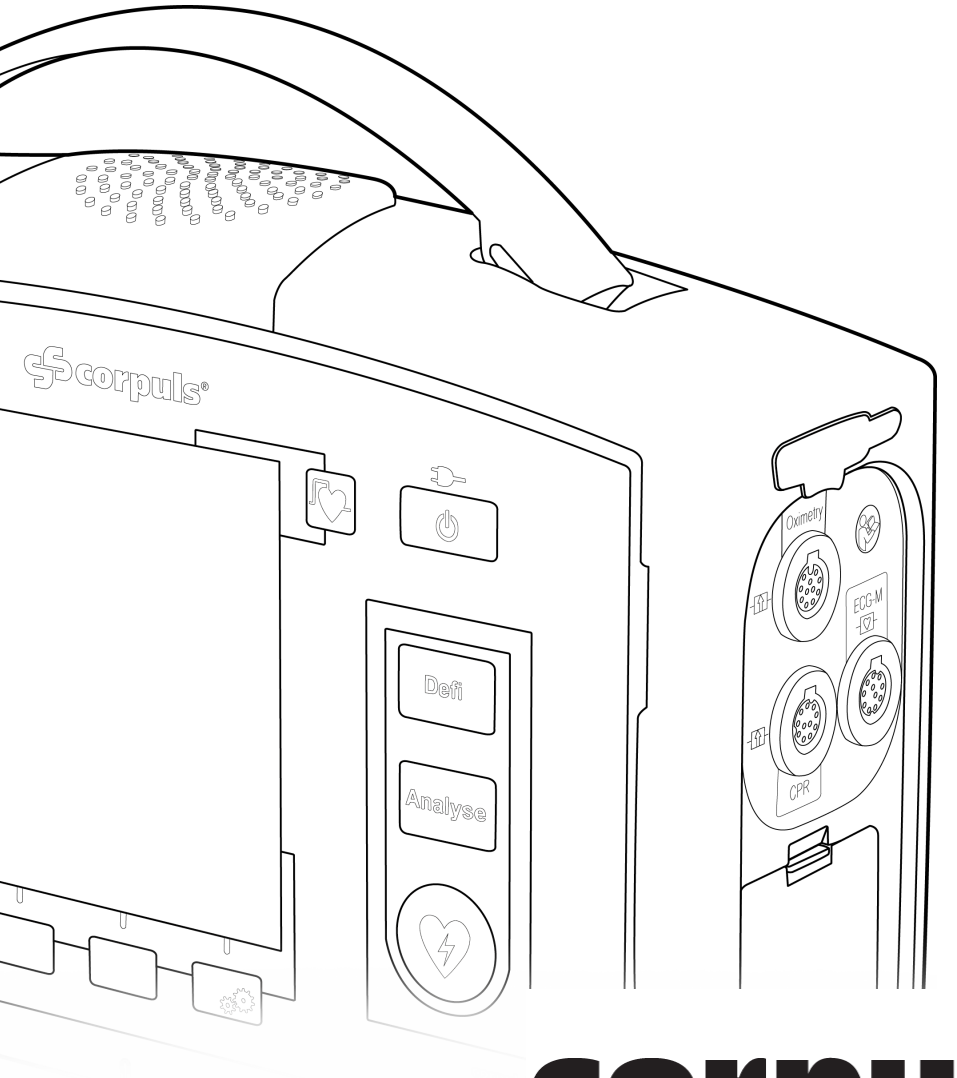
corpuls®
FOCUS - ON - PATIENTS

EN | USER MANUAL




# corpuls[1]

P/N 05130.02 | Version 2.2.1

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CE 0123

For a patient/user/third party in the European Union and in countries with identical regulatory regime (Regulation (EU) 2017/745 on Medical Devices); if, during the use of this device or as a result of its use, a serious incident has occurred, please report it to the manufacturer and/or its authorised representative and to your national authority.

Subject to technical modifications, mistakes and printing errors.



Further technical information can be obtained from the manufacturer.

# Service Address

Contact your authorised sales and service partners

Information about authorised service and sales partners at:

www.corpuls.world

# Versions of the User Manual

| Issue | Date | Versions of user manual | Version device |
|---|---|---|---|
| 1 | 2013-04-24 | 1.0 | 1.0 |
| 2 | 2013-12-17 | 1.1 | 1.1.0 |
| 3 | 2015-04-20 | 1.2 | 1.2.0 |
| 4 | 2015-11-16 | 1.3 | 1.3.2 |
| 5 | 2016-09-23 | 1.3 | 1.3.3 |
| 6 | 2018-04-12 | 2.0 | 2.0.0 |
| 7 | 2018-09-26 | 2.0.2 | 2.0.0 |
| 8 | 2018-11-27 | 2.0.2 | 2.0.0 |
| 9 | 2020-02-07 | 2.1 | 2.0.0 |
| 10 | 2020-07-30 | 2.1.1 | 2.1.0 |
| 11 | 2021-05-06 | 2.1.2 | 2.1.0 |
| 12 | 2022-12-06 | 2.1.3 | 2.1.0 |
| 13 | 2023-11-13 | 2.1.4 | 2.1.0 |
| 14 | 2024-01-09 | 2.2.0 | 2.2.0 |
| 15 | 2024-02-20 | 2.2.1 | 2.2.0 |

# New in this Version

The following table gives an overview of all new features in this version:

| Description |
| --- |
| Integration primeCPR Feedback system |
| Operating time battery |
| Update Alarm messages |
| Update Perfusion index message |
| Editorial changes |

Table of contents

# 1 Performance Description

## 1.1 Intended Purpose

The corpuls1 is intended for the following applications:

- For measurement and monitoring of vital functions
- For defibrillation, cardioversion, or external cardiac pacing (optional) of patients

The corpuls1 may only be used in the preclinical and clinical field. The corpuls1 may only be operated by qualified medical staff trained in the use of the device.

The following functions are available:

| | Default | Optionally available |
|---|---|---|
| Therapy functions, therapy supporting functions | • Defibrillation (AED mode, manual mode)<br>• Cardioversion | • External cardiac pacing<br>• CPR feedback |
| Monitoring functions | • ECG | • Pulse oximetry (PR, PI, SpO2)<br>• Extended pulse oximetry (SpCO, SpHb, SpMet) |

Tab. 1-1 Function overview corpuls1

## 1.2 Appropriate Use

The appropriate use of the corpuls1 includes the use of the following accessories:

- Accessories that are approved by the manufacturer
- Accessories that are appropriate for the function and the patient

The therapy functions defibrillation, cardioversion and external pacing may only be performed under constant observation of the patient.

If monitoring functions are performed, the patient's condition must be checked regularly even if the alarm function is switched on.

## 1.3 Use Environment

According to IEC 60601-1-2, the corpuls1 is intended for use in the EM environments "areas of home health care" and "professional healthcare institutions".

These are among others:

- Ambulance and patient transport vehicles
- Pre-clinical and clinical emergency medical service environments (inside and outside enclosed rooms)

The corpuls1 is approved for monitoring during the operation of diagnostic X-ray equipment (e.g. computed tomography). All oximetry options are excluded from this, as measured values can be falsified.

A more detailed description of the use environment can be found in the VIII Technical Specifications.

## 1.4 Operating Principles

In the following, the basic operating principles of the individual device components are described:

Monitoring functions

| Device function | Operating Principles |
|---|---|
| ECG | The functional principle is based on measuring the voltage on the body surface, which represents the electrical heart activity.<br>With the ECG cable, the bipolar extremity leads according to Einthoven (I, II, III) and the unipolar extremity leads according to Goldberger (aVR, aVL, aVF) can be recorded and displayed on the monitor. |
| Pulse oximetry, extended pulse oximetry | The functional principle is based on light absorption measurement.<br>Besides the peripheral pulse rate (PR), pulse oximetry measures the perfusion index (PI) and the arterial oxygen saturation (SpO2).<br>Extended oximetry options (available only with Masimo Rainbow SET Technology) incl. measurement of the methemoglobin level (SpMet), total haemoglobin (SpHb) and, depending on the used oximetry sensor, the level of carboxyhemoglobin (SpCO). |

Tab. 1-2 Operation principles Monitoring functions

Therapy functions

| Device function | Operating Principles |
|---|---|
| Defibrillator | A defibrillator delivers a defined amount of electrical current to the heart. This depolarizes a large amount of the heart muscle cells. As a consequence, the arrhythmia is then terminated. The body's own pacemaker in the sinus node of the heart is then able to restore the normal sinus rhythm.<br>Synchronized electrical cardioversion is an electrical shock that is delivered synchronously with the cardiac cycle.<br>The energy for defibrillation can be delivered to the patient by hard paddles / metal plates or adhesive electrodes. |
| Automatic external defibrillator (AED) | In AED mode, the user is assisted by an automated ECG analysis, verbal instructions (configurable) and a metronome (configurable).<br>The defibrillation pulse is triggered by the user. |
| Manual Defibrillation and Cardioversion | In manual defibrillation mode, the user has full freedom of action and decision-making. |
| External pacing | By electrical stimulation of the heart muscle, the external pacer of corpuls1 can supplement, positively influence, or completely take over its function as a pacemaker.<br>The pacer emits electrical pulses to the patient's heart muscle through electrodes attached to the patient's thorax.<br>The following modes are available:<br>• In the FIX operating mode, the heart muscle is stimulated regardless of the patient's own heart rate.<br>• In the DEMAND operating mode the heart muscle is only stimulated when the patient's own heart rate falls below the pre-set pacing frequency. |

Tab. 1-3 Operating principles Therapy functions

Therapy supporting functions

| Device function | Operating Principles |
|---|---|
| CPR feedback | During resuscitation, the CPR feedback function monitors the compression rate and depth of the chest compressions using a feedback sensor.<br>Feedback is provided to the user via speech and text messages to inform whether the depth or rate of the chest compressions is sufficient or should be adjusted. |
| Metronome | The metronome acoustically supports the user during the measures for cardiopulmonary resuscitation by emitting compression and ventilation tones.<br>The different tone sequences signal the rhythm for chest compressions and ventilation to the user. |

Tab. 1-4 Operating principles Therapy supporting functions

## 1.5 User Groups

The corpuls1 may only be operated by trained medical personnel, e.g., from hospitals, medical practices, rescue services, and authorities and organizations with security tasks.

The qualified personnel must have the following qualifications:

- An instruction in the proper handling, use and operation of the device in conjunction with the approved accessories
- A training in basic and advanced resuscitation techniques

A basic distinction is made between the following user groups:

- In-hospital staff professional
- In-hospital support staff
- Emergency medical staff professional
- Emergency medical support staff
- Operator

The initial instruction and training on the device must be performed by the manufacturer or by authorised personnel.

## 1.6 Intended Patient Group

Monitoring functions of the corpuls1 (ECG, pulse oximetry, extended oximetry) are used for adult, pediatric and neonatal patients with (suspected) disorders of the respiratory and/or cardiovascular system.

Therapy functions of the corpuls1 (defibrillation, cardioversion, external cardiac pacing) are used for adult, pediatric and neonatal patients with cardiac arrest or cardiac arrhythmia.

Defibrillation in AED mode is not recommended for patients under 12 months of age.

The CPR Feedback System is approved for patients from 8 years of age.

## 1.7 Indications and Contraindications

| Device function | Indication | Contraindication |
|---|---|---|
| Defibrillation, AED | • Cardiac arrest with ventricular fibrillation<br>• Pulseless ventricular tachycardia | • Normal ECG rhythm<br>• Pulseless electrical activity (PEA)<br>• Asystole (no heart activity)<br>• Palpable pulse or other signs of spontaneous circulation<br>• Children < 12 months old |
| Defibrillation, manual | • Cardiac arrest with ventricular fibrillation<br>• Pulseless ventricular tachycardia | • Normal ECG rhythm<br>• Pulseless electrical activity (PEA)<br>• Asystole (no heart activity)<br>• Palpable pulse or other signs of spontaneous circulation |
| Cardioversion | • Atrial fibrillation<br>• Atrial flutter<br>• Supraventricular tachycardia<br>• Ventricular (or other wide complex) tachycardia with pulse | • Normal ECG rhythm<br>• Sinus tachycardia (accelerated sinus rhythm)<br>• Ventricular fibrillation<br>• Pulseless ventricular tachycardia<br>• Bradycardia |
| External pacing | • Symptomatic bradycardia in adults and children | • Normal ECG rhythm<br>• Tachyarrhythmia |
| ECG | • Monitoring and recording of ECG and heart rate | n/a |
| Pulse oximetry, extended oximetry | • Monitoring of oxygen saturation, pulse rate and, optionally, extended oximetry | n/a |
| CPR feedback | • Cardiac arrest (resuscitation) | • Children < 8 years old<br>• Existing contraindication for chest compressions |

Tab. 1-5 Indications and Contraindications

Body areas

| Device function | Body area of contact |
|---|---|
| Defibrillation, AED | Thorax, heart, skin |
| Defibrillation, manual | Thorax, heart, skin |
| Cardioversion | Thorax, heart, skin |
| External pacing | Thorax, heart, skin |
| ECG | Thorax, extremities, skin |
| Pulse oximetry, extended oximetry | Extremities |
| CPR feedback | Thorax, skin |

Tab. 1-6 Body areas of contact

# 2 Directions for Users

## 2.1 Requirements for the User

In order to operate the corpuls1, among others, the following requirements have to be met by users:

- Users have to be professional medical personnel.
- Users must be trained in basic and advanced resuscitation measures.
- Users have been trained in handling the corpuls1. Applicable national laws and guidelines must be observed during training on the device.

## 2.2 Use of the Manual

The user manual has been compiled to enable better understanding of the corpuls1.

The user manual provides users with the following information:

- Safe and trouble-free operation of the corpuls1.
- Using the corpuls1 on a patient.
- Maintenance of the corpuls1.
- Troubleshooting help.

In addition to this user manual, the currently applicable laws, statutory- and hygiene regulations, generally accepted rules of technology as well as regulations for occupational health and safety and accident prevention must be complied with.

### 2.2.1 Typographic Conventions

The following table describes the typographic conventions.

The following table describes the typographic conventions.

| Typographic conventions | Description |
|---|---|
| **Key** | Indicates a key. |
| [Button] | Indicates a button. |
| ***Menu item*** | Indicates a menu item. |
| ***> Submenu item*** | Indicates a submenu item. |
| ⟨Text instruction⟩ | Indicates a text instruction/text message/confirmation prompt. |
| ✦Alarm✦ | Indicates an alarm. |
| *List* | Indicates a list. |
| *List box* | Indicates a list box. |
| *Value* | Indicates the value of an info mode parameter value. |

Tab. 2-1 Typographic Conventions

### 2.2.2 Content-related Conventions

(option) Device options are marked with "(Option)" in the headlines. If the corpuls1 is equipped with the respective option, the user must heed the information regarding this option.

(Accessories) Accessories are marked with "(Accessories)" in the headlines. If the corpuls1 is equipped with accessories, the user must heed the information regarding the accessories.

User The user is the operator of the corpuls1.

Depending on the user level DEFAULT, MAN. DEFIB. and OPERATOR, the user is called user "DEFAULT", user "MAN. DEFIB."

### 2.2.3 Depiction of Warnings

Warnings alert the user of possible sources of danger. Warnings are categorised into four levels of danger. The levels of danger DANGER, WARNING and CAUTION denote bodily injuries. The danger level NOTICE indicates material- and environmental damage. Warnings for a chapter are listed at the beginning of the chapter. The user must heed warnings.

**DANGER**

A hazard with a high degree of risk which, if not avoided, will result in death or serious injury.

**WARNING!**

A hazard with a medium degree of risk which, if not avoided, may result in death or serious injury.

**CAUTION**

A hazard with a low degree of risk which, if not avoided, may result in minor or moderate injury.

**NOTICE**

A hazard with a low degree of risk which, if not avoided, may result in minor or moderate damage to property or the environment.

### 2.2.4 Depiction of Notes

Notes point out important information which the user must heed when carrying out an instruction. Notes provide the user with additional information on a particular issue.

### 2.2.5 Depiction of Instructions

An instruction describes the steps the user has to perform to complete the task.

The symbol in the margin indicates an instruction and the pertaining steps. The instruction consists of the goal description, the pre-requisites, the individual steps and the results of a step.

## 2.3 Related Documents

For information necessary for safe and trouble-free operation of the device and its accessories, read the respective user manuals of the accessories.

## 2.4 Training Concept

To guarantee safe use of our devices on patients, the manufacturer relies on a comprehensive training concept which includes the following elements:

- E-Learning
- On site training
- Webinars and online trainings
- Further information, e.g. whitepapers

The training concept addresses different target audiences, e.g. multiplicators on the part of the manufacturer and the operator as well as users.

The information in this chapter is of general nature, as additional regulatory stipulations, e.g. for the qualification of medical device consultants have to be considered.

All training concepts will be adapted to the conditions of the customer, e.g. to specifications of device configuration or existing basic medical qualifications of the users.

### 2.4.1 Target audience

**Multiplicators on the part of the manufacturer**

Multiplicators on the part of the manufacturer are e.g. clinical educators, product specialists, employees in sales or other persons who have the qualification of medical device consultant pursuant to German medical device legislation.

**Objectives**

Multiplicators on the part of the manufacturer are fully trained multiplicators on the part of the operator and users. Furthermore, they have the following skills:

- They can advise customers and potential customers in matters of configuration and use of the product and to answer technical questions
- They can recommend technical features and accessories
- They can plan and implement trainings of users and multiplicators on the part of the customer/operator
- They can prepare reports of malfunctions or incidents in such a way that these can be analysed and evaluated by the competent specialist departments and/or authorities

**Implementation concept**

Further qualification is based on a full user training (see User on page 16). For the target audience of multiplicators on the part of the manufacturer each year several national and international on site trainings are offered which aim to impart the necessary competence to advise and train customers.

Besides the on site trainings, trainings on e.g. special topics or new features are offered via webinars, online trainings and E-learning. With relevant changes in the hard- or software, attendance is mandatory to keep the competence record valid.

The obtained competence records have limited validity, which should ensure regular attendance at the offered advanced trainings.

**Multiplicators on the part of the customer/operator**

Multiplicators on the part of the customer/operator are persons who perform the role of person responsible for the device commissioned by the operator pursuant to German medical device legislation.

**Objectives**

Multiplicators on the part of the customer/operator are full trained users. Furthermore, they have the following skills:

- Knowing the configuration options of the device, they can implement these according to the respective use cases
- They know the stipulations specific to the operator, suchas maintenance- and inspection periods
- They can advise the user on device related issues
- They can plan and implement a user training according to the overall concept and the objectives
- Knowing the reporting channels, they can analyse and describe malfunctions or incidents on the part of the operator and report these as intended

**Implementation concept**

This target audience is always trained by the multiplicators on the part of the manufacturer in order to maintain corresponding quality standards. For the training of this target audience, the manufacturer offers standardised training materials and training concepts.

Also the qualification to be a multiplicator on the part of the customer/operator is based on a full user training and is comprised of all elements mentioned above.

**User**

Users are all persons who work with devices by the manufacturer on a patient. They are trained on principle by multiplicators on the part of the customer/operator.

**Objectives**

Users have the following skills:

- They know the essential features of the device
- They know the areas of application and pertaining limitations
- They can use the device safely on a patient
- They can perform reprocessing as intended after use in a mission
- They can perform functional checks as described in the user manual
- They can react adaequately to malfunctions

**Implementation concept**

The training concept for users consists of a comprehensive E-learning course for theoretical preparation and an on site training. In the latter, particular attention is given to exploring the functions relevant in day-to-day work.

Also for this target audience, the manufacturer offers standardised training materials and training concepts which are regularly updated.

The basic responsibility of qualifying the users lies with the operator/customer.

### 2.4.2 Taking into Account Country-Specific Requirements

Requirements on the training concepts implemented for the respective customers are defined by country-specific normative regulations as well.

In those cases, the manufacturer matches the central training concept individually to the conditions of the customer.

### 2.4.3 Initial Product Training

The initial instruction and training on the device must be performed by the manufacturer or by authorised personnel. With each significant modification of the product or its accessories the user has to be trained again on the product and its accessories.

## 2.5 Data Protection

Some device options save or transfer personal data for provision of services and patient care in encrypted form. The General Data Protection Regulation (EU) 2016/679 as well as further applicable guidelines, ordinances and laws are respected.

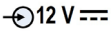
## 2.6 Symbols

The following table describes the symbols used in the user manual.

| Symbol | Designation | Description |
|---|---|---|
|  | Alarm on | Indicates in the status line that alarm suspension is deactivated.<br>Indicates in the vital parameter field the alarm status "on" of the vital parameter. |
|  | Alarm off | Indicates in the status line that alarm suspension is permanently activated.<br>Indicates in the vital parameter field the alarm status "off" of the vital parameter. |
|  | Alarm pause | Indicates in the vital parameter field that alarm suspension is temporarily activated. |
|  | System alarm confirmed | Indicates an confirmed alarm of the alarm history in the status line. |
|  | Upper alarm limit | Indicates the upper alarm limit of a vital parameter in the configuration dialogue. |
|  | Lower alarm limit | Indicates the lower alarm limit of a vital parameter in the configuration dialogue. |
|  | Heart rate (QRS complex) | Indicates the heart rate, measured via ECG- or therapy electrodes in the curve field. |
|  | Heart rate (SpO2 pulse) | Indicates the heart rate, measured via the oximetry sensor (SpO2), in the curve field. |
|  | QRS marker | Indicates in the curve field that the corpuls1 recognised a QRS complex. |
|  | Pacer impulse mark | Indicates the pacer impulse mark of an implanted pacer in the curve field. |
|  | Mission duration<br>Calibration | The status line indicates the mission duration.<br>Indicates in the vital parameter field that the pulse oximeter is calibrating. |
|  | Confidence | Indicates in the vital parameter field a low confidence of the readings. |
|  | Battery operation | Indicates in the status line that the corpuls1 operates on battery. |
|  | Mains operation | Indicates in the status line that the corpuls1 operates on mains power. |
|  | Screenshot status | Indicates in the status line that the screenshot view is open. |

Tab. 2-2 Symbols

| Symbol | Designation | Description |
|---|---|---|
|  | Screenshot Function | Indicates in the softkey line the screenshot function.<br>NOTE:<br>In the screenshot view, this symbol is not assigned to this softkey. |
|  | Patient group Adult | Indicates in the status line that the patient group Adult has been selected. |
|  | Patient group Child | Indicates in the status line that the patient group Child has been selected. |
|  | Patient class Neonate | Indicates in the status line that the patient group Neonate has been selected. |
|  | SD® card | Indicates in the status line that the corpuls1 stores mission data on the SD® card. |
|  | Selected checkbox | Indicates in the configuration dialogue that the option of the checkbox has been selected. |
|  | Unselected checkbox | Indicates in the configuration dialogue that the option of the checkbox is no longer selected. |
|  | **On/Off** key | Indicates the **On/Off** key. |
|  | **Shock** key | Indicates the **Shock** key. |
|  | **Main menu** key | Indicates the **Main menu** key. |
|  | **Alarm** key | Indicates the **Alarm** key. |
|  | **Pacer** key | Indicates the **Pacer** key. |
|  | Application part with defibrillation protection, type BF | Indicates a defibrillation-proof application part, type BF (Body Floating). |
|  | Application part with defibrillation protection, type CF | Indicates a defibrillation-proof application part, type CF (Cardiac Floating). |
|  | Manufacturer | Indicates the manufacturer of the corpuls1 on the rating plate. |
|  | Part number | Indicates the part number on the rating plate. |
|  | Serial number | Indicates the serial number on the rating plate. |
|  | Read the user manual | Indicates in the rating plate that the User Manual must be observed. |

| Symbol | Designation | Description |
|---|---|---|
|  | Trash can (device) | Indicates in the rating plate that the materials should not be disposed of via the household waste. |
|   | Protection class | Indicates in the rating plate that the corpuls1 is dust- and splash-proof. |
|   | Protection class | Indicates that the charging brackets are protected against water dripping at an angle 15° relative to vertical. |
|  | Protection class I | Indicates that the device complies with the safety requirements of this protection class. |
|  | Protection class II | Indicates that the charging brackets comply with the safety requirements of this protection class. |
|   | External DC supply | Indicates that the corpuls1 can be supplied and/or charged with direct current via an external AC adapter. |
|  | Recycling | Indicates that there is a recycling process for the materials. |
|   | Medical device | Indicates that the item is a medical device. |
|  | Repackaging | To identify that a modification to the original medical device packaging configuration has occurred. |
|  | Importer | Indicates the entity importing the medical device into the locale. |
|  | Distributor | Indicates the entity distributing the medical device into the locale. |
|   | Unique Device Identifier | Indicates a carrier that contains Unique Device Identifier information. |
|  | CE Mark | Indicates in the rating plate that the corpuls1 is approved by the Notified Body. |
|  | Rechargeable Battery (Battery Pack) | The battery rating plate indicates that the battery can be recharged. |
|  | Caution | The battery rating plate indicates that the battery must be handled with care. |
|  | Do not throw the battery into fire | The battery rating plate indicates that the battery must not be thrown into fire. |
|  | Do not deform the battery | The battery rating plate indicates that the battery must not be deformed. |
|  | Read the user manual or the electronic user manual | Indicates that the user must observe the User Manual. |

| Symbol | Designation | Description |
|---|---|---|
|  | Keep dry | Indicates a medical device that has to be protected from wetness/moisture. |
|  | Fragile, handle with care | Indicates a medical device that can break or be damaged when handled carelessly. |
|  | Protect from (sun)light | Indicates a medical device that has to be protected from light sources. |
|   | Temperature limit | Indicates the temperature limit values to which the medical device can be exposed safely. |
|  | Here is the top | To indicate correct upright position of the transport package. |
| **NOK** | Functional test failed | Indicates that a functional test has failed. |
| **OK** | Functional test passed | Indicates that a functional test has been passed. |

Tab. 2-3 Symbols

# 3 Safety

## 3.1 Safety Instructions for the User

Safety instructions inform the user of fundamental risks when operating the corpuls1.

The corpuls1 is protected against interferences that may stem from electro-surgical devices.

**DANGER**

Burning or explosion of the corpuls1 due to wrong environmental conditions during operation!

May lead to severe injuries or death of users, patients or third parties.

► Do not operate the corpuls1 in the following situations: In the vicinity of readily inflammable anaesthetics or other inflammable substances as well as in an oxygen-rich (> 23%) environment.

**DANGER**

Must not be used with conscious patients!

Electric shock while using the defibrillator may have the following side effects for patients, users and third parties: cardiac arrhythmia, ventricular fibrillation (VF) or asystole.

► Do not use the defibrillator function of the corpuls1 if the patient is conscious.

► Ventricular fibrillation (VT) or ventricular tachycardia (VT) may be detected even in patients who are conscious.

**WARNING!**

Use of a high-frequency surgical device!

May lead to burn injuries of the user and patient due to leak currents from the high-frequency device to the therapy electrodes.

► Do not operate the corpuls1 in connection with a high-frequency surgical device or a microwave therapy device.

**WARNING!**

Risk of injury due to unapproved accessories

Using unapproved accessories can lead to increased electromagnetic interference, decreased electromagnetic immunity and malfunctions. Falsified readings of the monitoring functions, delays or aborted therapy can cause serious injury.

► Make sure to use accessories provided or approved by the manufacturer.

**WARNING!**

System crash!

Can lead to the user no longer being able to operate the corpuls1.

► Hold down **On/Off** key for 8 s.

► If necessary, remove battery and re-insert.

If the user removes the battery during operation or holds down the **On/Off** key for longer than 8 s, the corpuls1 cannot store the current mission data correctly.

**⚠ WARNING!**

Continuous operation of the corpuls1!

If the user keeps the corpuls1 running after each patient mission, a permanent availability of the system cannot be guaranteed.

► Switch off the corpuls1 regularly (after max. 12 h) and restart, in particular after each patient mission.

**⚠ CAUTION**

Electromagnetic fields of other devices!

Can cause distortions in the ECG of the corpuls1 and impede ECG analysis so that the release of a shock is not possible or the function of the external pacer is not available. Can lead to malfunctions of other devices in the vicinity.

► Do not store the corpuls1 in the immediate vicinity of other devices or stacked with other devices.

► Check before the mission, if malfunctions occur in the corpuls1 or in other devices.

**NOTICE**

Conductive parts between electrodes and connectors!

Can cause malfunctions in the corpuls1 and in other devices. Can lead to failure of the corpuls1 or of other devices.

► Make sure that the conductive parts of electrodes and attached plugs do not touch other conductive parts including the ground. Other conductive parts can be, e. g. metal parts of stretchers.

**⚠ WARNING!**

Wrong device arrangement!

Avoid using the corpuls1 in immediate vicinity of other devices or stacked with other devices, because this could lead to faulty operation of the corpuls1.

► Do not store corpuls1 in the immediate vicinity of other devices or stacked with other devices.

► If use as described above is nevertheless necessary, observe the corpuls1 and other devices to ensure correct functioning.

**⚠ WARNING!**

Bringing portable radios near the corpuls1!

The use of portable radios, including accessories as e. g. antenna cables and external antennas in to short a distance to the corpuls1 can lead to a decrease of performance characteristics of the corpuls1.

► Do not use portable and mobile HF communications equipment at a distance less than 30 cm (or 12 in ) to the parts and leads of the corpuls1 indicated by the user.

**⚠ WARNING!**

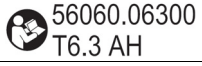
Electric shock due to mains voltage!

If the corpuls1 is operated with an unauthorised AC adapter without protective conductor, there is risk of an electric shock.

► To avoid the risk of electric shock, connect the corpuls1 only to a mains voltage supply with a protective conductor.

## 3.2 Warning- and Notice Labels on the Device

The following table describes the warning- and notice labels on the housing of the corpuls1.

| Warning-/Notice labels | Description |
|---|---|
|  | Mind the user manual. |
|  | Defibrillation-proof application part, type BF (Body Floating). Insulated application parts of this type are approved for external and internal application at the patient. |
|  | Defibrillation proof application part, type CF (Cardiac Floating). Insulated application parts of this type are approved for immediate application at or in the heart of the patient. |
|   | Safety plate of the charging bracket and the adapter charging bracket. |
|  | Disposal notes battery. |

Tab. 3-1 Warning- and Notice Labels on the Device

## 3.3 Software UDI

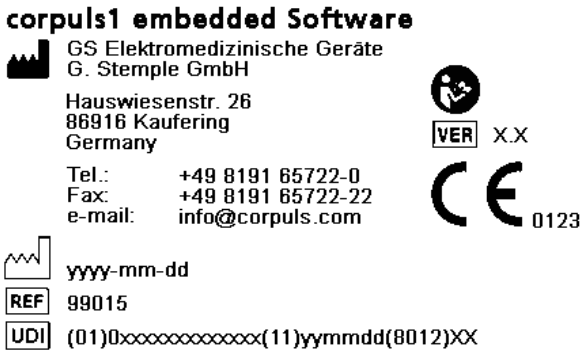



Fig. 3-1 Example of Software-UDI corpuls1

# 4 Device Description

## 4.1 Description of Functions

The operating principles of the individual device modules can be found in chapter 1.4 Operating Principles. The operating principles of the accessories are described in the corresponding chapters.

| Module group | Module | Variant |
|---|---|---|
| Monitoring modules | ECG | |
| | Pulse oximetry | |
| | Extended pulse oximetry | |
| Therapy modules | Defibrillator | AED |
| | | Manual |
| | External pacer | |
| Module supporting therapy | CPR feedback | corPatch CPR feedback system |
| | | primeCPR feedback system |
| | Metronome | |
| Accessories | Therapy electrodes | corPatch easy |
| | Shock paddles | |
| | Shock spoons | |
| | CPR feedback sensors | corPatch CPR disposable sensor |
| | | primeCPR easy feedback sensor (disposable) |
| | | primeCPR feedback sensor (reusable) |

Tab. 4-1 Overview functional modules

## 4.2 Evaluation Software

The software for evaluation of mission data **corpuls.manager REVIEW** and **corpuls.manager ANALYSE** is available free of charge with every device. The software can be downloaded at my.corpuls.world.

Compatibility with other corpuls products

The following table gives an overview of the compatibility of corpuls1 to **corpuls.manager REVIEW** and **corpuls.manager ANALYSE**.

All versions are downwards compatible.

| corpuls1 software version | Version **corpuls.manager REVIEW** | Version **corpuls.manager ANALYSE** |
|---|---|---|
| 1.0.0 | as of 1.2 | |
| 1.1.0 | as of 1.3 | |
| 1.2.0 | as of 1.5 | |
| 1.3.x | as of 1.6 | |
| 2.0.x | as of Darwin 1906 | |
| 2.1.x | as of Everest 1912 | as of Everest 1912 |
| 2.2.x | as of Ives 2402 | as of Ives 2402 |

## 4.3 Interfaces

The interfaces of the corpuls1 allow to connect various cables and sensors.

### 4.3.1 Front Side of the Device

At the front side of the device the following interfaces are located:


Fig. 4-1 Interfaces at the front side of the device (illustration without pacer option)

1 Therapy socket

The therapy socket allows to connect therapy electrodes (see 10.4 Connecting Therapy Accessories on page 77).

### 4.3.2 Rear side of the device

At the rear side of the device the following interfaces are located:

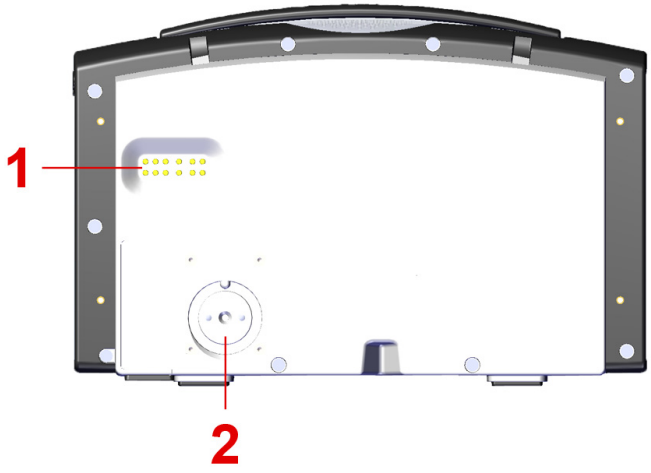



Fig. 4-2 Interfaces at the rear side of the device

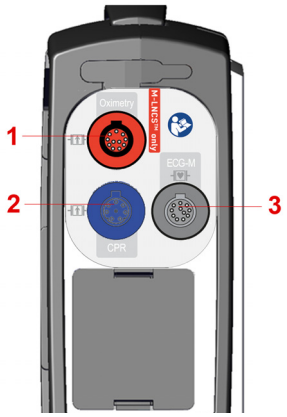
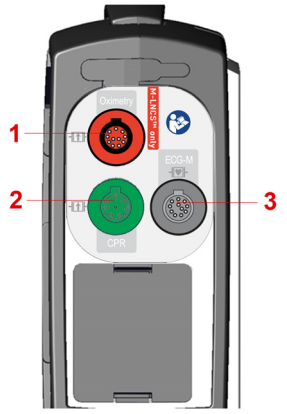
1 Data interface socket (in preparation)

2 Magnetic contact field interface

The magnetic contact field allows to operate the corpuls1 in mains operation (see 4.6 Mains operation on page 30) and to charge the battery (see 5.3 Charging the Battery on page 36).

### 4.3.3 Right hand side of the device

On the right hand side of the device the following interface variants can be available:

| | |
|---|---|
| (1) - Interface pulse oximetry (Masimo rainbow SET®)<br>(2) - Interface ECG-M |  |
| (1) - Interface pulse oximetry (Masimo SET®)<br>(2) - Interface CPR feedback (corPatch CPR feedback sensor)<br>(3) - Interface ECG-M |  |
| (1) - Interface pulse oximetry (Masimo SET®)<br>(2) - Interface CPR feedback (primeCPR feedback sensor)<br>(3) - Interface ECG-M |  |

Tab. 4-2 Interface variants right hand side of the device

The Oximetry interface allows to connect a pulse oximetry sensor (see 9.7 Pulse oximetry (option)).

The CPR interface allows to connect a CPR Feedback sensor.

The interface ECG-M allows to connect ECG electrodes (9.6 ECG monitoring).

Make sure to connect only plugs and sockets of the same colour.

### 4.3.4 Bottom side of the device

At the bottom of the device the following interface can be found:

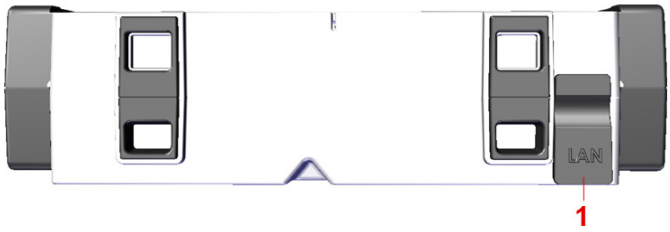



Fig. 4-3 LAN interface

1 LAN interface

The LAN interface allows to connect a LAN cable for service purposes.

## 4.4 Display and Operating Elements

The following illustration gives an overview of the display and operating elements of the corpuls1.

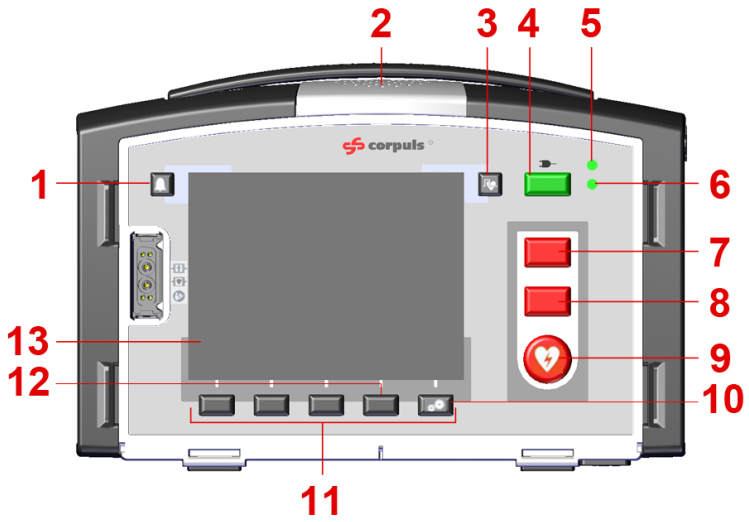



Fig. 4-4 Display- and operating elements (Illustration with pacer option)

| Item | Element | Description |
|---|---|---|
| 1 | **Alarm** key | The following functions are available:<br>• Calling up the alarm history (see 6.10 Alarm history on page 54).<br>• Confirming alarms (see 6.10 Alarm history on page 54).<br>• Suspending or silencing patient alarms (see 6.8 Alarm suspension on page 53). |
| 2 | Alarm light | Indicates alarms visually and acoustically (see 4.7 Alarm Design on page 31). |
| 3 | **Pacer** key | Allows to call up or close the pacer mode (see 10.8.3 Overview Pacer mode on page 100). The **Pacer** key is only available in corpuls1 devices equipped with the pacer option. |
| 4 | **On/Off** key | Allows to enable or disable the corpuls1 (see 5.2 Switching the device on and off on page 34). |
| 5 | LED Battery status | Indicates the charging status.<br>Glows orange in mains operation when battery is being charged. It may take up to 60 s until the LED Battery status is glowing.<br>Glows yellow in mains operation when battery is fully charged.<br>NOTE:<br>Does not glow when operating on battery power. |

Tab. 4-3 Overview AED Mode

| Item | Element | Description |
|---|---|---|
| 6 | LED Operating status | Indicates the operating status.<br>Glows green when corpuls1 is switched on.<br>Indicates full operational readiness of the corpuls1 when the corpuls1 is switched off (flashes up regularly) or whether errors have occurred (no flashes) ExternalLink: Automatischer Selbsttest. |
| 7 | Key **Defib** | Allows to call up the AED mode or manual mode. |
| 8 | **Analyse** key | Allows to start an ECG analysis or to call up the defibrillation mode. |
| 9 | **Shock** key | Allows to deliver a shock or to call up the defibrillation mode. |
| 19 | Softkey [Menu] or key **Main menu** | Allows to call up the main menu in monitoring mode by pressing briefly and in pacer mode and defibrillation modes by holding down. |
| 11 | Softkeys | Allow to navigate in menus and to change settings. The softkeys are assigned different functions, depending on the current operating mode. The respective softkey fulfills the function that is assigned in the user interface. |
| 12 | Softkey | Allows to create a screenshot in monitoring mode, defibrillation mode and pacer mode (see 6.7 Screenshot Function on page 52).<br>NOTE:<br>Even when the symbol is not displayed, the screenshot function is available in defibrillation- and pacer modes. |

Tab. 4-4 Overview AED Mode

## 4.5 Battery operation

Battery operation allows a mobile and flexible use of the corpuls1. The screen shows the symbol for battery operation and the remaining running time of the battery 257 min (see 6.1 Structure of the user interface on page 41).

If the charging status of the battery is < 20 %, the corpuls1 issues an alarm (see 16 Alarms and Messages on page 176).

## 4.6 Mains operation

Mains operation allows a stationary use of the corpuls1 and the charging of the battery (see 5.3 Charging the Battery on page 36). The screen shows the symbol for mains operation and the charging status of the battery 61 % (see 6.1 Structure of the user interface on page 41).

The user can operate the corpuls1 on mains power as follows:

- With an AC adapter with magnetic clip (MagCode) (see VI Approved accessories and consumables on page 210).
- With a charging bracket (see 17 Charging brackets (Accessories) on page 194).

## 4.7 Alarm Design

The alarms are classified in following groups:

- Patient alarms
  - Alarms for vital parameters (physiological alarms)
  - Alarms indicating loose electrodes and sensors (technical alarms)
- System alarms
  - All other alarms (technical alarms)

The corpuls1 signals alarms over following device elements:

- Status line/Alarm line (Alarm history) (see 6.10 Alarm history on page 54)
- Highlighted vital parameter field – at patient alarms (additional to status line/alarm line)
- Alarm light
- Alarm tone

Alarms are classified according to their priorities high, medium and low. The following table shows how the alarm history and the alarm light indicate and signal the alarm priorities.

| Signal | High priority | Medium priority | Low priority |
|---|---|---|---|
| Status line/Alarm line (Alarm history) | Head of alarm line:<br>„!!!“ (highlighted in red - not confirmed)<br>„!!!“(greyed out - confirmed) | Head of alarm line:<br>„!!“ (highlighted in yellow - not confirmed)<br>„!!“ (greyed out - confirmed) | Head of alarm line:<br>„!“ (highlighted in blue - not confirmed)<br>„!“ (greyed out - confirmed) |
| Alarm light | Flashing red and tone sequence. | Flashing yellow and tone sequence. | Flashing cyan and tone sequence. |

Tab. 4-5 Indication of alarm priorities by means of alarm history and alarm light

### 4.7.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Potential danger due to inappropriate alarm presettings in area of application!

If the user operates the device in an area of application other than the usual, the alarm settings may cause misunderstandings.

► Adjust alarm settings.

### 4.7.2 Alarming in the status line

If the corpuls1 signals new alarms in the status line/alarm line, the corpuls1 shows these alarms first as follows:


Fig. 4-5 Example: Alarm line after a new alarm is issued

This illustration shows the number of not-confirmed alarms. The colour indicates the priority of the not-confirmed alarm. The status line shows the current time or the deployment time alternating every 5 s.

If the user opens the alarm history and confirms alarms (see 6.10 Alarm history on page 54), the corpuls1 shows the following alarm list:

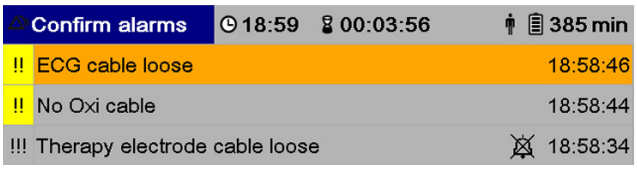



Fig. 4-6 Example: Open alarm history

The open alarm history shows the user prompt ⟨Confirm alarms⟩ highlighted in blue in the first line. In the following, the not-confirmed alarms are listed and highlighted according to their priority (**!!!**/red - high; **!!**/yellow - medium; **!**/blue - low), with the first alarm entry marked. Below those, the already confirmed alarms are listed, sorted by priority. Confirmed alarms are marked additionally with a crossed-out bell symbol .

Certain technical alarms (system alarms) are latching alarms that will not disappear even after confirmation, as long as the cause is present. All other technical alarms (patient alarms) are non-latching and disappear after a restart of the corpuls1.

The corpuls1 offers two options to suppress an alarm:

- Alarm suspension (optical signal and alarm tone)
- Alarm Tone Silencing Function

Both kinds of alarm suspension depend on the settings configured by the user OPERATOR. The user OPERATOR can only activate one of these two options, not both simultaneously.

Alarm suspension

The general alarm suspension can be activated in every operation mode with the **Alarm** key. The general alarm suspension inactivates the optical signal at the alarm light and the alarm tone for all alarms. The alarm history lists all old alarms and new technical alarms.

In defibrillation mode, all physiological alarms are suspended automatically. That means, physiological alarms do not trigger the optical signal at the alarm light, no alarm tone and are not listed in the alarm history.

When quitting the defibrillation mode and the general alarm suspension is not activated, the corpuls1 checks all physiological alarms and signals them again, if necessary.

Alarm Tone Silencing Function

The alarm tone silencing function only inactivates the alarm tone from all former active alarms. As soon as a new alarm is issued, the alarm tone silencing function is deactivated again. The corpuls1 also signals all former alarms again.

Reminder signal

The reminder signal indicates that the general alarm suspension has been activated by pressing **Alarm.** If the reminder signal is activated, the alarm light flashes up white and a tone is sounding. The reminder signal is repeated at a time interval of 60 s.

If the reminder signal has been activated (Settings by user OPERATOR).and the general alarm suspension has been activated, the corpuls1 issues the reminder signal.

The particular suspension of a physiological alarm in a vital parameter field does not trigger the reminder signal.

### 4.7.3 Alarming in the Vital parameter field

With patient alarms, the pertaining vital parameter field is highlighted in colour, in addition to the alarming in the status-/alarm line.

If vital parameter values are outside the alarm limits, the corpuls1 triggers a physiological alarm. This is not true for defibrillation mode.

Alarm suspension Vital parameter field

The suspension of physiological alarms in a vital parameter field (see 6.4 Vital parameter context menu on page 45) inactivates the alarm output in the alarm history, the alarm tone and the optical signal at the alarm light. The vital parameter field remains inverted/highlighted.

Deactivation of the general alarm suspension by pressing the **Alarm** key (see 6.4.4 Switching off a vital parameter alarm on page 47) does not deactivate the alarm suspension of a specific vital parameter alarm.

# 5 Installation

## 5.1 Unpacking the device

Before the user can operate the corpuls1, the user has to unpack the corpuls1.

In case the corpuls1 is damaged or if parts of the corpuls1 or of the accessories are missing, immediately contact your authorised service and sales partner.

To make the device fully operational, proceed as follows:

1. Take the corpuls1 out of the transport box.
2. Remove packaging material.
3. Check if all ordered parts have been delivered.
4. Check the device corpuls1 for damage.
5. Inserting the battery (see 5.4 Changing the Battery on page 37).
6. Fixate (see 18.2 Packing and fixating the left accessory bag on page 198) and pack (see 18.3 Packing and fixating the right accessory bag on page 200) the accessory bags.

## 5.2 Switching the device on and off

To operate the corpuls1, the user has to switch on the corpuls1. After the mission, the user can switch off the corpuls1.

### 5.2.1 Switching on the device

The corpuls1 can start in Monitoring mode, AED mode or Manual mode. The start modes depend on the settings configured by the user OPERATOR.

To switch the device on, proceed as follows:

1. Press **On/Off** key.

To reach operational status, the corpuls1 needs up to 20 s.

The start user interface appears.

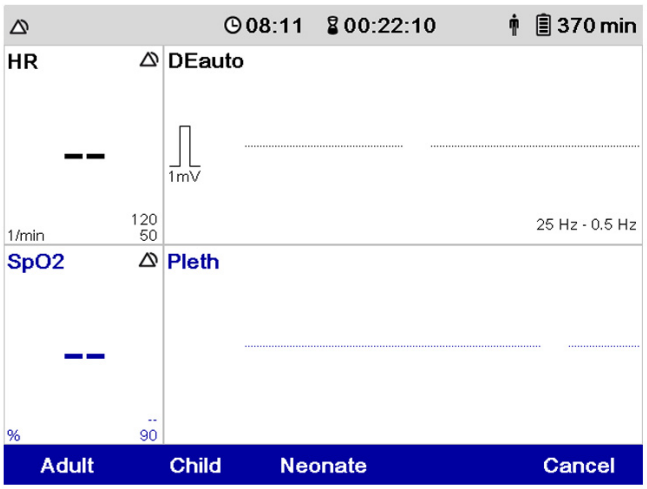



Fig. 5-1 Start Screen (monitoring mode)

The user can select the patient group indicated by the symbol Patient group in the status line top right.

The corpuls1 automatically closes the patient group selection after an internally defined period of time. Only if no therapy electrodes are connected, the selection dialogue remains. The selection dialogue remains until the user has selected a patient group.

The user can also close the selection dialogue of patient group by pressing e. g. the **Defib** key. The corpuls1 adopts then the standard value of the therapy electrodes.

### 5.2.2 Switching off the device

After the mission, the user can switch off the corpuls1.

To switch the device off, proceed as follows:

1. Press On/Off key.
   The confirmation prompt ⟨Power Off?⟩ appears.
   When the pacer is active, the confirmation prompt ⟨Switch off pacer? - Power Off?⟩ appears in the message line.

To abort the process, press softkey [Cancel]. If no softkey is pressed, the message disappears automatically after 10 s. The corpuls1 stays switched on.

2. Press softkey [OK].
3. One of the following situations occurs:
   a) The corpuls1 switches off.
   b) The display shows due service events (see 15 Service Events on page 174). Confirm service events by pressing the softkey [Confirm]. The corpuls1 switches off.

### 5.2.3 Automatic Shutdown

If the remaining running time of the battery is 10 min or less, the corpuls1 shuts down automatically after 20 s. The message ⟨System shutting down in 20s⟩ appears in the message line.

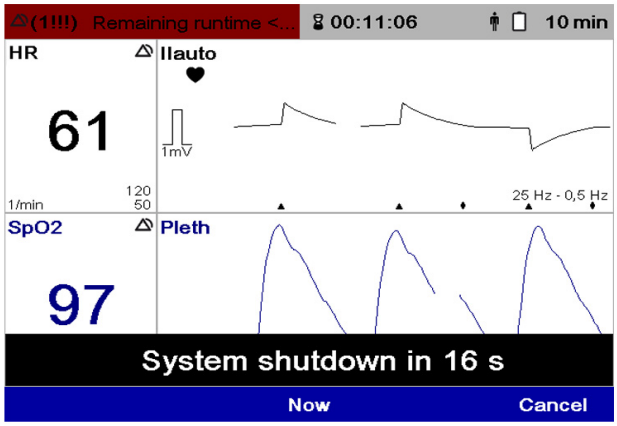



Fig. 5-2 Message before automatic shut down

At the same time as the message, the alarm message ⟨Remaining runtime <10min⟩ appears.

The message ⟨System shutdown in XXs⟩ appears in all modes. In pacer mode, this message appears only in the calling up phase, not in the pacing phase (even during monitoring mode). In pacer mode, only the parallel alarm message appears.

After the countdown is done, the message ⟨System is shutting down ...⟩ appears in the message line.

The user can accelerate or cancel the shutdown process.

To accelerate or cancel the shutdown process, proceed as follows:

1. Press softkey [Now] to save event data and immediately shut down the corpuls1.
2. To abort the shut-down process, press softkey [Cancel].

**NOTICE**

Continued operation after initiated shutdown!

If the user prevents automatic shutdown and
operates the corpuls1 until the battery is completely empty, mission data may be lost.

► Acknowledge automatically initiated shutdown to enable the shutdown.

## 5.3 Charging the Battery

To charge the battery, the following options are available:

- AC adapter with magnetic clip (MagCode)
- Charging brackets

The battery can be charged with the corpuls1 switched on or off. During the charging process, the battery remains inserted in the corpuls1. The LED Battery status indicates the current charging status. The screen of the switched-on corpuls1 shows the charging status of the battery. The user can operate the corpuls1 while charging is in progress.

If the user connects the corpuls1 to a power supply (AC adapter or charging bracket) and no battery is inserted, the corpuls1 automatically switches on and issues an alarm message that the battery is missing.

How to charge the battery via AC adapter with magnetic clip (MagCode) is described in the following. For information how to charge the battery in a charging bracket, refer to the chapter Charging Brackets (see 17 Charging brackets (Accessories) on page 194).

To charge the battery, proceed as follows:

Prerequisite:

✓ The battery is inserted (see 5.4 Changing the Battery on page 37)

✓ The AC adapter is connected to a power supply

1. Connect (item A) the magnetic clip (item 1) to the magnetic contact field interface (item 2). The cable of the magnetic clip has to point upwards. The magnetic clip automatically snaps into place at the magnetic contact field.

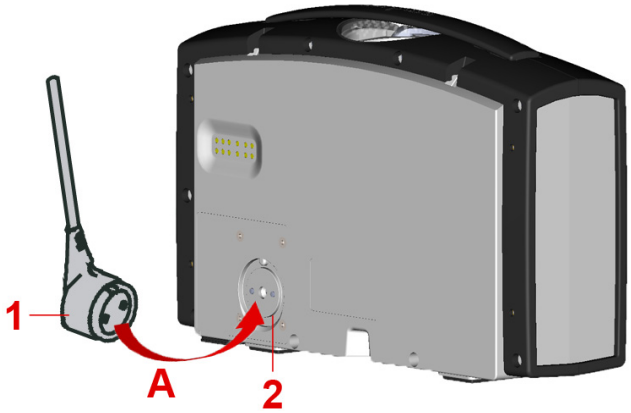



Fig. 5-3 Connect the magnetic clip (MagCode) to the magnetic contact field interface

1 Magnetic clip (MagCode)

2 Magnetic contact field interface

The status line shows the symbol for mains operation. The LED Charging status glows orange as long as the corpuls1 charges the battery.

## 5.4 Changing the Battery

The user can replace the battery..

**⚠ WARNING!**

Improper handling during battery replacement!

Can lead to patient or user injury as a result of electric shock, burns, fire or explosion.

- ► Only change the battery by adequately trained personnel.
- ► Do not short circuit the battery.
- ► Do not deform or disassemble battery.
- ► Do not throw the battery into fire and keep away from welding or soldering.
- ► Replace the old or damaged battery and dispose of it professionally at once.

To replace the battery, proceed as follows:

Prerequisite:

✓ corpuls1 is switched off (see 5.2.2 Switching off the device on page 35)

1. Pinch together (item A) both locking clips (item 1).

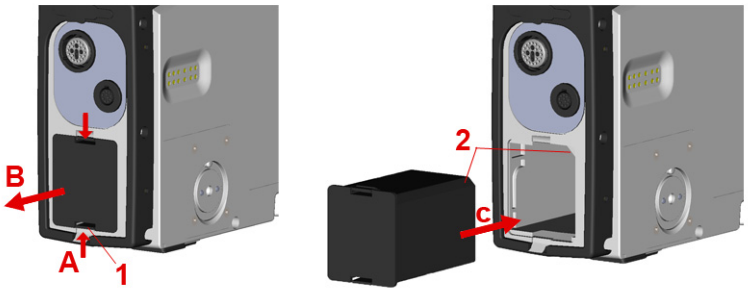



Fig. 5-4 Change the battery

1 Locking clip

2 Guidance groove

The battery is unlocked.

2. Pull out the battery (item B).
3. Insert the new battery into the battery compartment and push (item C).

   Both locks (item 1) engage audibly.

## 5.5 Inserting the SD Card

To be able to store mission data on a SD card, the user has to have a SD card inserted during the mission.

Even if the write protection of the SD card is enabled, the corpuls1 can save mission data on the SD card.

Exclusively use authorised SD cards. The SD card has to be formatted with the FAT32 file system.

To insert the SD card, proceed as follows:

1. Remove the protective cover from the SD card slot.


Fig. 5-5 Inserting SD card (pictured: right side of device without CPR interface)

1 SD card slot

2. Push the SD card with the contacts facing upwards into the SD card slot (item 1).
   The SD card snaps into place with an audible click.
3. Replace the cover of the SD card slot.
   The SD card is inserted in the device.

## 5.6 Removing the SD Card

To evaluate the mission data, the SD card has to be removed from the device.

To remove the SD card from the slot, proceed as follows:

1. Remove the protective cover from the SD card slot.


Fig. 5-6 Inserting SD card (pictured: right side of device without CPR interface)

1 SD card slot

2. Push the SD card further into the SD card slot (item 1).
   The SD card disengages with a click.
3. Remove the SD card.

4. Replace the cover of the SD card slot.

   The SD card is removed.

**NOTICE**

Premature removal of the SD card!

Can lead to data loss due to data being saved incorrectly or not at all.

- ► If the symbol appears in the status line, the SD card must remain inserted in the corpuls1 and the corpuls1 must remain switched on.
- ► Before removing the SD card, switch off the corpuls1.

# 6 User interface Monitoring mode

This chapter shows the user interface and instructs the user how to operate the corpuls1 in monitoring mode. The monitoring mode allows the monitoring of the patient by means of ECG monitoring (see 9.6 ECG monitoring on page 70) and pulse oximetry monitoring (see 9.7 Pulse oximetry (option) on page 71).

## 6.1 Structure of the user interface

The following illustration shows the structure of the user interface in monitoring mode.

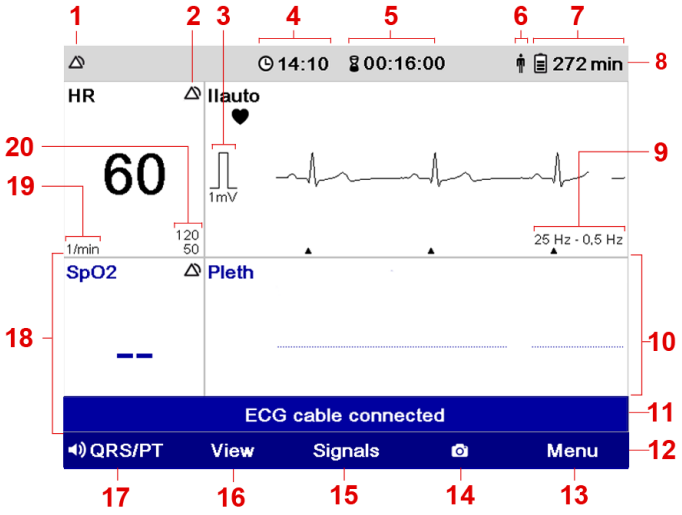



Fig. 6-1 Structure of the user interface in monitoring mode

| Item | Element | Description |
|---|---|---|
| 1 | Alarm suspension | Indicates whether the alarm suspension has been activated or deactivated (see 6.8 Alarm suspension on page 53). |
| 2 | Alarm status of the vital parameters | Indicates if the alarm for a vital parameter has been enabled (see 6.4.5 Switching on a vital parameter alarm on page 47) or disabled (see 6.4.4 Switching off a vital parameter alarm on page 47). |
| 3 | Amplitude settings | Indicates the amplitude setting (see 6.5.2 Overview Curve context menu on page 48). |
| 4 | Time | Indicates the current time (see 12.9.2 Submenu item Settings on page 131). |

Tab. 6-1 Elements of the user interface in monitoring mode

| Item | Element | Description |
|---|---|---|
| 5 | Mission duration | Indicates the duration of the mission. |
| 6 | Patient group | Shows the selected patient group (see 12.3 Menu item Alarms on page 114). |
| 7 | Battery operation/Mains operation | Shows either the symbol for battery operation and the remaining running time (see 6.7 Screenshot Function on page 52) or the symbol for mains operation and the charging status (see 6.4.2 Overview Vital parameter context menu on page 46). |
| 8 | Status Line | Indicates the operating status of the corpuls1.<br>Shown are: Alarm suspension, alarm history, current time, mission duration, patient group and power supply mode. |
| 9 | Filter settings | Displays the filter settings for the ECG filter (see 6.6 Softkey Context Menu Synchronisation on page 50). |
| 10 | Curve field | Displays a curve.<br>If a curve gets no valid signal, the curve field shows a dotted line. If a valid signal in a curve field is larger than the display area, the curve field shows a dotted line at the upper and lower borders. |
| 11 | Message line | Indicates a message. |
| 12 | Softkey line | Indicates the current assignment of the softkeys. |
| 13 | Softkey [Menu] | Allows to open the main menu (see 6.6.1 Softkey Context Menu QRS/PT on page 50). |
| 14 | Softkey  | Allows to create a screenshot in monitoring mode, defibrillation mode (symbol  ) and defibrillation mode and pacer mode (in pacer mode without symbol  ) (see 12.8.2 Submenu item Patient class/-group on page 128). |
| 15 | Softkey [Signals] | Allows to open the parameter- and curve context menu (see 4.5 Battery operation on page 30). |
| 16 | Softkey [View] | Allows to change the view (see 4.6 Mains operation on page 30). |
| 17 | Softkey [QRS] | Allows to change the volume of the QRS/PT tone (see 13.1.3.1 Submenu item Filter on page 138). |
| 18 | Vital parameter field | Displays a vital parameter.<br>If a vital parameter gets no valid signal, the vital parameter field shows two dashes.<br>If a vital parameter value is measured with low confidence, the vital parameter field shows a ? (question mark). |
| 19 | Unit of the vital parameter | Shows the measuring unit of a vital parameter. |
| 20 | Alarm limits | Indicates the upper and lower alarm limits of the vital parameters (see 6.2.1 Opening the Main Menu on page 43).<br>When an alarm limit has been deactivated via the main menu Settings, the field shows two dashes instead. |

Tab. 6-2 Elements of the user interface in monitoring mode

The symbol ▲ in the curve field indicates a QRS marker.

The black flashing symbol ♥ in the curve field indicates a QRS complex. The blue flashing symbol ♥ in the curve field indicates the heart rate measured via the pulse oximetry sensor.

The corpuls1 detects pacer pulses coming from another source (e. g. from a pacer implanted in the patient) via ECG electrodes and displays them in the curve fields with a lozenge symbol ◆. If the ECG is derived from therapy electrodes (DE lead), these pacer marks are not displayed.

## 6.2 Main menu

In the main menu, the user can change the settings (see 12 Settings Main menu on page 113).

Some settings require the rights of the user level OPERATOR (see 13 Settings Main menu (User level OPERATOR) on page 137).

### 6.2.1 Opening the Main Menu

The user can open the main menu in every operating mode.

To open the main menu in monitoring mode, proceed as follows:

1. Press softkey [OK] (see 6.1 Structure of the user interface on page 41).
   The main menu has been opened.

### 6.2.2 Overview main menu

The following illustration gives an overview of the main menu.

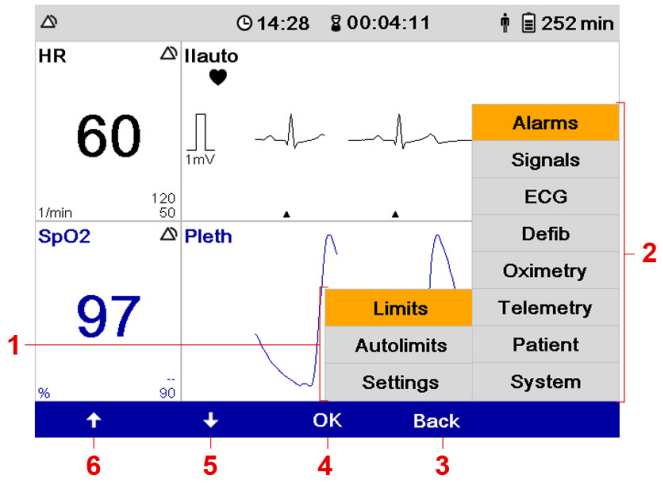



Fig. 6-2 Overview main menu

| Item | Element | Description |
|---|---|---|
| 1 | Submenu | Shows submenu items. |
| 2 | Main menu | Shows menu items. |
| 3 | Softkey [Back] | The following functions are available:<br>• Closing menus<br>• Closing submenus |
| 4 | Softkey [OK] | The following functions are available:<br>• Selecting menu items<br>• Closing submenus |
| 5 | Softkey [Down] | The following functions are available:<br>• Navigating between the menu items<br>• Navigating between the submenu items |
| 6 | Softkey [Up] | The following functions are available:<br>• Navigating between the menu items<br>• Navigating between the submenu items |

Tab. 6-3 Overview main menu

### 6.2.3 Navigating in the menu

Via the softkeys the user can navigate in the menu.

To navigate in the menu, proceed as follows:

Prerequisite:

✓ The menu has been opened (see 6.2.1 Opening the Main Menu on page 43)

1. Navigate to the required menu item by pressing the softkey [Up] or [Down].
   The menu item is marked in yellow.
2. To select the menu item, press softkey [OK].
   The submenu has been opened.

To close the submenu, press softkey [Back].

3. Navigate to the required submenu item by pressing the softkey [Up] or [Down].
   The submenu item is marked in yellow.
4. To select the submenu item, press softkey [OK].
   The settings for the submenu item have been opened (see 12 Settings Main menu on page 113).

## 6.3 Overview parameter- and curve context menu

In the vital parameter- and curve context menu the user can change the settings for the vital parameters and curves. The user can change additional settings in the menu (see 12.4 Menu item Signals on page 118). The following illustration gives an overview of the parameter- and curve context menu.

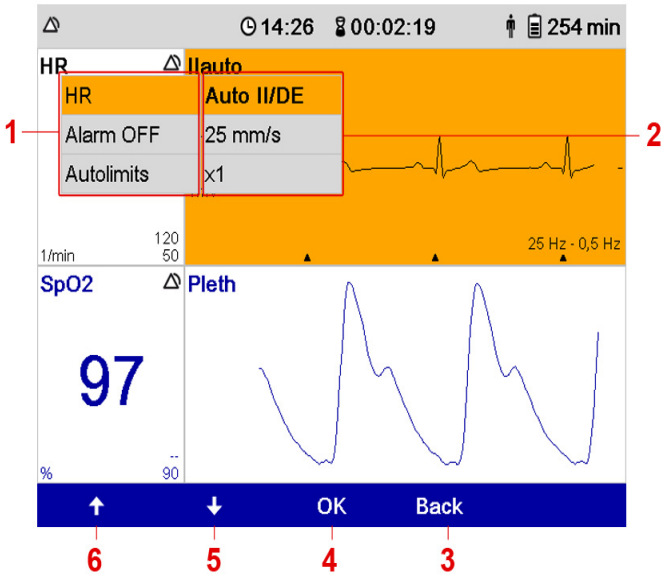



Fig. 6-3 Overview parameter- and curve context menu

| Item | Element | Description |
|---|---|---|
| 1 | Vital parameter context menu | Allows to change the settings for a vital parameter (see 6.4 Vital parameter context menu on page 45). |
| 2 | Curve context menu | Allows to change the settings for a curve (see 6.5 Curve context menu on page 48). |
| 3 | Softkey [Back] | The following functions are available:<br>• Closing menus<br>• Closing submenus |
| 4 | Softkey [OK] | The following functions are available:<br>• Selecting menu items<br>• Closing submenus |
| 5 | Softkey [Down] | The following functions are available:<br>• Navigating between the menu items<br>• Navigating between the submenu items |
| 6 | Softkey [Up] | The following functions are available:<br>• Navigating between the menu items<br>• Navigating between the submenu items |

Tab. 6-4 Overview parameter- and curve context menu

## 6.4 Vital parameter context menu

The user can change settings for the vital parameters in the vital parameter context menu.

### 6.4.1 Open vital parameter context menu

The user can open the vital parameter context menu only in monitoring mode.

To open the vital parameter context menu, proceed as follows:

1. Press softkey [Signals](see 6.1 Structure of the user interface on page 41).
2. Navigate to the required vital parameter field by pressing the softkey [Up] or [Down].
   The required vital parameter field is marked in yellow.

3. Press softkey [OK].
   The vital parameter context menu is open.

### 6.4.2 Overview Vital parameter context menu

The following illustration gives an overview of the vital parameter context menu.

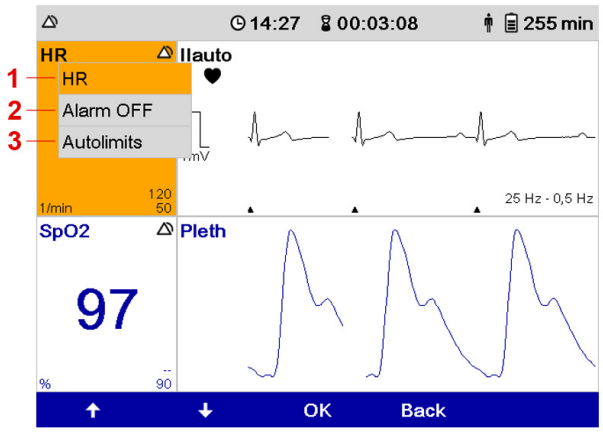



Fig. 6-4 Overview Vital parameter context menu

| Item | Element | Description |
|---|---|---|
| 1 | List box<br>*Vital parameters* (here HR) | Allows to change the vital parameters for a vital parameter field (see 6.4.3 Changing Vital Parameter Settings on page 46). |
| 2 | List box<br>*Vital parameter alarm (here: Alarm OFF)* | Allows to disable (see 6.4.4 Switching off a vital parameter alarm on page 47) or enable (see 6.4.5 Switching on a vital parameter alarm on page 47) the alarm for a vital parameter. |
| 3 | List box<br>*Vital parameter autolimits (here: Auto. Limits)* | Allows to adopt the configured auto limits for a vital parameter (see 6.4.6 Adopting Auto Limits on page 47). |

Tab. 6-5 Overview Vital parameter context menu

There are no alarm limits for the vital parameter perfusion index (PI). Therefore the list box *Vital parameter autolimits* is not available.

### 6.4.3 Changing Vital Parameter Settings

Allows to change the vital parameters for a vital parameter field.

To change a vital parameter, proceed as follows:

Prerequisite:

✓ The vital parameter context menu is open (see 6.4.1 Open vital parameter context menu on page 45)

1. Navigate to the list box *Vital parameter* by pressing the softkey [Up] or [Down].
   The list box *Vital parameter* is marked in yellow.
2. Press softkey [OK].
   The vital parameter is emphasised in bold font.
3. Navigate to the required vital parameter by pressing the softkey [Up] or [Down].
   The vital parameter is displayed.
4. Press softkey [OK].

The vital parameter field shows the vital parameter.

### 6.4.4 Switching off a vital parameter alarm

The user can disable the switched on physiological alarm for a vital parameter.

To disable the alarm for a vital parameter, proceed as follows:

Prerequisite:

✓ The vital parameter context menu is open (see 6.4.1 Open vital parameter context menu on page 45)

1. Navigate to the list box *Alarm OFF* by pressing the softkey [Up] or [Down].
   The list box *Alarm OFF* is marked in yellow.
2. Press softkey [OK].
   The vital parameter alarm is switched off. The vital parameter field shows the symbol .

If the alarm for a particular vital parameter has been disabled, the corpuls1 will signal no alarms for this vital parameter. In case of alarms, only the vital parameter field is highlighted.

When the alarm is disabled in the vital parameter context menu, the corpuls1 automatically enables the alarm in the following situations:

- The corpuls1 is configured in such a way that the respective vital parameter field is no longer displayed.

- A pre-configured view is chosen for the corpuls1 so that the respective vital parameter field is no longer displayed.

- Leaving a defibrillation mode.

### 6.4.5 Switching on a vital parameter alarm

The user can enable a disabled alarm for a vital parameter.

To enable the alarm for a vital parameter, proceed as follows:

Prerequisite:

✓ The vital parameter context menu is open (see 6.4.1 Open vital parameter context menu on page 45)

1. Navigate to the list box *Alarm ON* by pressing the softkey [Up] or [Down].
   The list box *Alarm ON* is marked in yellow.
2. Press softkey [OK].
   The vital parameter alarm is switched on. The vital parameter field shows the symbol .

### 6.4.6 Adopting Auto Limits

To adopt the automatically calculated alarm limits (autolimits) for a vital parameter, the user has the following options (see 6.4.1 Open vital parameter context menu on page 45):

- Automatically adopting the configured alarm limits.
  If there is no signal from a vital parameter, the user can adopt the configured alarm limits (see 6.4.3 Changing Vital Parameter Settings on page 46).
- Adopting automatically calculated autolimits based on the current value of the vital parameter.
  If there is a signal from a vital parameter, the user can adopt the automatically calculated autolimits.

To adopt the autolimits for a vital parameter, proceed as follows:

Prerequisite:

✓ The vital parameter context menu is open (see 6.3 Overview parameter- and curve context menu on page 44)

1. Navigate to the list box *Autolimits* by pressing the softkey [Up] or [Down].
   The list box *Autolimits* is marked in yellow.
2. Press softkey [OK].
   The automatically calculated or the pre-set autolimits have been adopted for a vital parameter.

## 6.5 Curve context menu

In the curve context menu the user can change the settings for the curves.

### 6.5.1 Open curve context menu

The user can open the curve context menu only in monitoring mode.

To open a curve context menu, proceed as follows:

1. Press softkey [Signals](see 6.1 Structure of the user interface on page 41).
2. Navigate to the required curve by pressing the softkey [Up] or [Down].
   The current curve is marked in yellow.
3. Press softkey [OK].
   The curve context menu is open.

### 6.5.2 Overview Curve context menu

The following illustration gives an overview of the curve context menu.

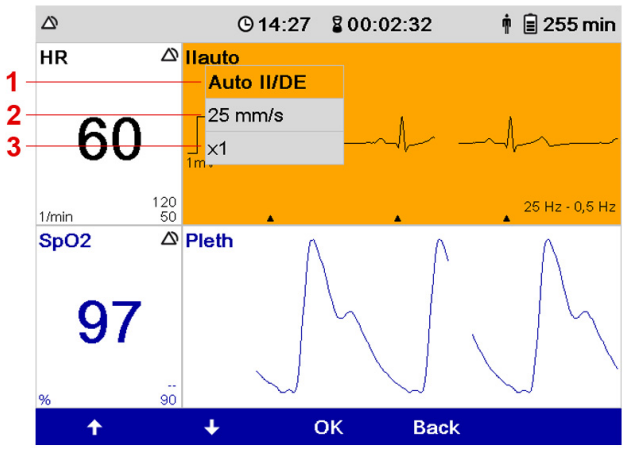



Fig. 6-5 Overview Curve context menu

| Item | Element | Description |
|---|---|---|
| 1 | List box<br>*Curve* | Allows to change the vital parameters for a curve field (see 6.5.3 Changing curve parameters on page 49). |
| 2 | List box<br>*Sweep speed* | Allows to select the sweep speed (see 6.5.4 Changing the sweep speed on page 49) for a curve. |
| 3 | List box<br>Curve amplitude | Allows to change the amplitude (see 6.5.5 Changing the curve amplitude on page 49) of a curve. |

Tab. 6-6 Overview Curve context menu

### 6.5.3 Changing curve parameters

The user can change the curve of a curve field.

To change a curve, proceed as follows:

Prerequisite:

✓ The curve context menu is open (see 6.5.1 Open curve context menu on page 48)

1. Navigate to the list box *Curves* by pressing the softkey [Up] or [Down].
   The list box *Curves* is marked in yellow.
2. Press softkey [OK].
   The current curve is emphasised in bold font.
3. Navigate to the required curve by pressing the softkey [Up] or [Down].
   The curve is displayed.
4. Press softkey [OK].
   The curve field shows the curve.

### 6.5.4 Changing the sweep speed

The user can change the sweep speed for a curve.

To change the sweep speed, proceed as follows:

Prerequisite:

✓ The curve context menu is open (see 6.5.1 Open curve context menu on page 48)

1. Navigate to the list box *Sweep speed* by pressing the softkey [Up] or [Down].
   The list box *Sweep speed* is marked in yellow.
2. Press softkey [OK].
   The current sweep speed is emphasised in bold font.
3. Navigate to the required sweep speed by pressing the softkey [Up] or [Down].
   The sweep speed is displayed.
4. Press softkey [OK].
   The curve field shows the curve with the changed sweep speed.

A change of the sweep speed affects all leads including the CPR curve.

### 6.5.5 Changing the curve amplitude

The user can change the amplitude for an ECG curve.

To change the amplitude, proceed as follows:

Prerequisite:

✓ The curve context menu is open (see 6.5.1 Open curve context menu on page 48)

1. Navigate to the list box *Amplitude* by pressing the softkey [Up] or [Down].
   The list box *Amplitude* is marked in yellow.
2. Press softkey [OK].
   The current amplitude is emphasised in bold font.
3. Navigate to the required amplitude by pressing the softkey [Up] or [Down].
   The amplitude is displayed.
4. Press softkey [OK].
   The curve field shows the curve with the changed amplitude.

A change of the amplitude affects all leads.

## 6.6 Softkey Context Menu Synchronisation

The softkey context menu allows fast access to the settings of the menu.

### 6.6.1 Softkey Context Menu QRS/PT

The softkey context menu QRS/PT allows to enable and disable the QRS/PT tone and to change the volume of the QRS tone and the PT tone.

The user can enable and disable the QRS tone (see 12.5 Menu item ECG on page 122) and the pulse tone (see 12.7 Menu item Oximetry on page 126), and set the volume of the QRS/PT tone.

Changing the volume for the QRS/PT tone in the softkey context menu affects both the QRS tone and the pulse tone.

If both the QRS tone and the pulse tone are disabled, changing the volume in the softkey context menu QRS/PT implies enabling both for the current mission. If a valid ECG signal is present, the QRS tone sounds.

To access the softkey context menu QRS/PT, proceed as follows:

1. The following options are available:

   a) To disable the QRS/PT tone, press the softkey [QRS/PT].
   The QRS/PT tone has been disabled.

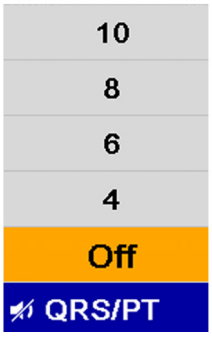



Fig. 6-6 Softkey context menu QRS/PT (here: QRS/PT tone disabled)

   b) To change the volume of the QRS/PT tone, press softkey [QRS/PT] repeatedly until the required volume value is marked in yellow.
   The volume of the QRS/PT tone has been changed.

### 6.6.2 Softkey Context Menu View

The softkey context menu View allows to invert the screen or to select a pre-configured view.

The user can also invert the screen (see 12.1 Overview Settings on page 113) or select a pre-configured view (see 12.4.3 Submenu item Views on page 121) in the configuration settings.

To access the softkey context menu View, proceed as follows:

1. The following options are available:

   a) To invert the screen, press softkey [View] twice.
   The screen is inverted.

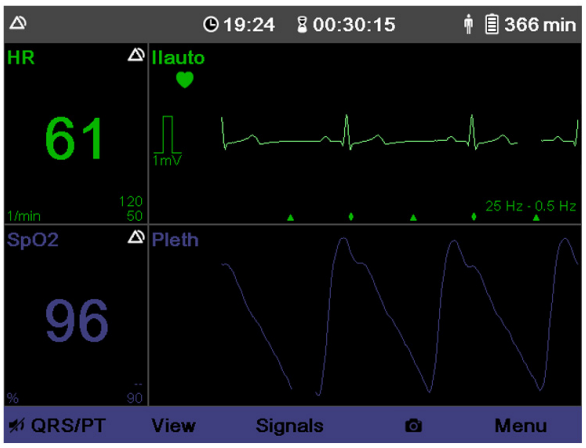



Fig. 6-7 Inverted screen

   b) To select a view, press softkey [View] repeatedly until the required view is marked in yellow.

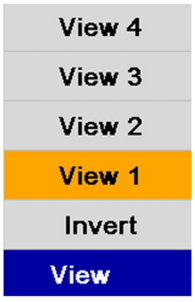



Fig. 6-8 Softkey context menu view (here: View1)

   The display shows the selected view.

## 6.7 Screenshot Function

The screenshot function (assigned to the second softkey from the right) allows to save and view the current screen content as a picture file.

Created screenshots are stored in the internal memory or on the SD card (see 11.1 Mission Data Storage on page 112).

### 6.7.1 Creating a screenshot

The user can create a screenshot in every operating mode.

To create a screenshot, proceed as follows:

1. Press softkey (see 6.1 Structure of the user interface on page 41).

In the other operating modes (defibrillation mode and pacemaker mode), hod down the softkey corresponding to the icon of the monitoring mode.

   The message [Screenshot successful] appears.

### 6.7.2 Showing Screenshots

The screenshot viewer allows to view created screenshots from the current mission.

To open the screenshot viewer, proceed as follows:

1. In the menu ***Patient***, select > ***Screenshots***.
   The screenshot viewer shows the most recent screenshot. The status line shows the symbol .

If the user has not yet created a screenshot, the screenshot viewer shows a big camera symbol.

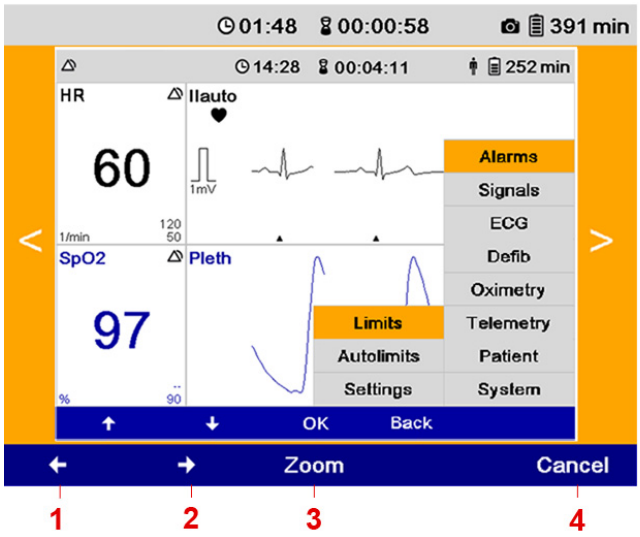



Fig. 6-9 Screenshot Viewer

1 Softkey [Left]
2 Softkey [Right]
3 Softkey Zoom
4 Softkey [Cancel]

To close the screenshot viewer, press softkey [Cancel].

2. The following options are available:
   a) If the screenshot viewer shows the symbol , press softkey [Left] to view older screenshots.
      The older screenshot appears.
   b) If the screenshot viewer shows the symbol , press softkey [Right] to view newer screenshots.
      The newer screenshot appears.
   c) To enlarge the selected screenshot to full screen, press softkey [Zoom].
      The screenshot stays enlarged for approx. 7 s and then returns to thumbnail size.

By pressing any softkey, the screenshot can be reduced immediately.

## 6.8 Alarm suspension

The corpuls1 allows to suspend alarms. The alarm suspension inactivates the optical signal at the alarm light and the alarm tone.

The user can activate either the function Alarm suspension or Alarm tone silencing, depending on the settings configured by the user OPERATOR.

The alarm suspension function is only available, if the user OPERATOR has activated the function. If the function Alarm suspension is activated, the following values are available: *perm.* or 30 s, 60 s, 90 s, 120 s, 180 s (temporary alarm suspension).

If the user OPERATOR has deactivated this function (Value: *Off*) the user cannot enable or disable the alarm suspension.

### 6.8.1 Activating alarm suspension

The user can enable the alarm suspension. If the alarm suspension is activated, the corpuls1 will issue system alarms but no patient alarms (see 4.7 Alarm Design on page 31).

To enable alarm suspension, proceed as follows:

1. Hold down the **Alarm** key for two seconds (see 4.4 Display and Operating Elements on page 28)
   In case of permanent alarm suspension the status line shows the symbol  . In case of temporary alarm suspension the status line shows the symbol  and a countdown of the remaining seconds of the temporary alarm suspension.
   The message ⟨Permanent alarm suspension⟩ appears.

### 6.8.2 Deactivating alarm suspension

If the alarm suspension is enabled permanently or the configured suspension time is not yet expired, the alarm suspension may be disabled by the user. After the configured period of time is expired ,the alarm suspension is automatically disabled.

To disable the alarm suspension, proceed as follows:

1. Hold down the **Alarm** key for two seconds.
   The status line shows the symbol .

## 6.9 Alarm Tone Silencing Function

The corpuls1 allows to silence the alarm tones of all former active alarms.

The user can activate either the function Alarm suspension or Alarm tone silencing, depending on the settings configured by the user OPERATOR.

### 6.9.1 Enabling the Alarm Tone Silencing Function

The user can enable the alarm tone silencing function. If the alarm tone silencing function has been enabled, the corpuls1 no longer signals the alarms acoustically. A new alarm disables the alarm tone silencing function.

To enable the alarm tone silencing function, proceed as follows:

1. Hold down the **Alarm** key for two seconds (see 4.7 Alarm Design on page 31).
   The corpuls1 emits a short acoustic signal to inform the user about the activation of the alarm tone silencing function.

## 6.10 Alarm history

The alarm history lists the last six issued alarms. Alarms that have been confirmed by the user, appear at the bottom of the alarm history or disappear automatically from the alarm history.

The alarm history can contain up to 256 alarms. If the alarm history contains more than 256 alarms, the oldest alarms are overwritten.

The alarm history displays all active non-confirmed and confirmed alarms that have not automatically disappeared. The alarms are sorted from confirmed (top) to not-confirmed (bottom). The active alarms are sorted by priority and then in descending order by the time of their occurrence (last time stamp on top). Alarms are active, if the conditions that trigger the alarm are present.

### 6.10.1 Opening alarm history

If there are alarms present, the user can open the alarm history in every operating mode.

To open the alarm history, proceed as follows:

1. Press **Alarm** key (see 4.4 Display and Operating Elements on page 28).

   The uppermost non-confirmed alarm is marked in yellow.

If the user does not press a key or a softkey, the message disappears automatically after four seconds.

### 6.10.2 Alarm history

If the corpuls1 signals new alarms in the status line/alarm line, the corpuls1 shows these alarms first as follows:


Fig. 6-10 Example: Status line/Alarm line with new alarm

This illustration shows the number of not-confirmed alarms. The colour indicates the priority of the not-confirmed alarm. The status line shows the current time or the deployment time alternating every 5 s.

The user can open the alarm history with the Alarm key:

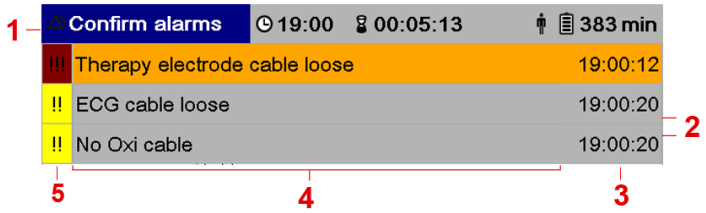



Fig. 6-11 Example: Alarm history

| Item | Element | Description |
|---|---|---|
| 1 | Status Line | Shows the confirmation request ⟨Confirm alarms⟩ highlighted in blue. |
| 2 | Alarms | Below the status line the alarm history lists not-confirmed alarms.<br>Below that are confirmed alarms. |
| 3 | Alarm time | Indicates the time of occurrence of the alarm. |
| 4 | Alarm text | Shows the alarm text (see 16 Alarms and Messages on page 176). Only the topmost alarm entry is marked in yellow. |
| 5 | Alarm priority | Indicates the priority of the alarm (see 4.7 Alarm Design on page 31).<br>Different colours and the number of exclamation marks signal the priority of the alarms. |

Tab. 6-7 Overview Alarm history

### 6.10.3 Confirm alarms

In the alarm history the user can confirm alarms.

To confirm an alarm, proceed as follows:

Prerequisite:

✓ Alarm history is open (see 6.10.1 Opening alarm history on page 55)

1. Press **Alarm** key.

   The alarm has been confirmed and disappears from the alarm history. The next alarm is marked in yellow.

Additionally, the parameter field is inverted. Confirmed alarms are no longer indicated by the alarm light.

# 7 User Interface in Defibrillation Mode

This chapter shows the user interface and instructs the user how to operate the corpuls1 in defibrillation mode. The corpuls1 allows to defibrillate a patient in automatic defibrillation mode (AED mode) (see 10.7.4 Overview AED Mode on page 89) and in manual defibrillation mode (see 10.7.7 Overview Manual Mode on page 93).

## 7.1 Structure of the user interface

The following illustration shows the user interface in the defibrillation modes with the example of the manual mode.

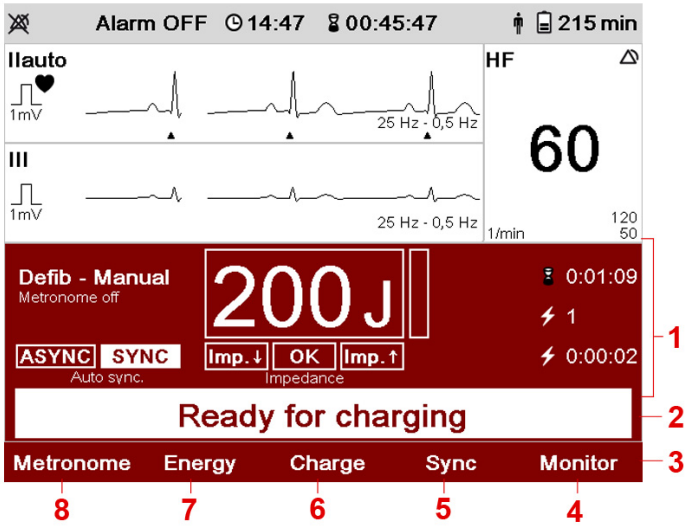



Fig. 7-1 Structure of the user interface in a defibrillation mode (Example: manual mode)

| Item | Element | Description |
|---|---|---|
| 1 | Defibrillator user interface | Shows available parameters of the defibrillation modes.<br>For available parameters in AED mode (see 10.7.4 Overview AED Mode on page 89).<br>For available parameters in manual mode (see 10.7.7 Overview Manual Mode on page 93). |
| 2 | Message line | Indicates a message. |
| 3 | Softkey line | Indicates the current assignment of the softkeys. |

Tab. 7-1 Elements of the user interface in defibrillation mode

| Item | Element | Description |
|---|---|---|
| 4 | Softkey [Monitor] | Allows to close the defibrillation mode and to return to monitoring mode (see 7.6 Switching to Monitoring Mode on page 62). |
| 5 | Softkey [Sync] (only in manual mode) | Allows to select the synchronisation option (see 7.3 Softkey Context Menu Synchronisation on page 58). |
| 6 | Softkey [Charge] (only in manual mode) | Allows to charge the defibrillator (see 7.4 Charging the Defibrillator on page 60). |
| 7 | Softkey [Energy] | Allows to select the energy for the shock (see 7.3.3 Softkey Context Menu Shock Energy on page 59). |
| 8 | Softkey [Metronome] | Allows to select the metronome mode (see 7.3.1 Softkey Context Menu Metronome on page 58). |

Tab. 7-2 Elements of the user interface in defibrillation mode

The corpuls1 allows to show two curve fields and a maximum of two vital parameter fields in the defibrillation modes.

The curve field 1 is not configurable and shows the lead Auto II/DE. The curve field 2 and one vital parameter field depend on the settings configured by the user OPERATOR.

The symbols ▲, ♥, ♥, ◆ have the same meaning as in monitoring mode.

In the defibrillation modes the user cannot open or configure curve context menus or vital parameter context menus.

## 7.2 Shock Energy

The user can change the shock energy in manual mode.

To change the shock energy in manual mode, proceed as follows:

1. Navigate to the required energy level by pressing the softkey [Up] or [Down].
2. Press softkey [OK].
   The energy level has been selected and is displayed in the defibrillator user interface.
3. Alternatively, use the softkey context menu to select the energy level (see 7.3.3 Softkey Context Menu Shock Energy on page 59).

In AED mode the energy level can only be selected via the softkey context menu (see 7.3.3 Softkey Context Menu Shock Energy on page 59).

## 7.3 Softkey Context Menu Synchronisation

The softkey context menu in defibrillation mode allows selection of the metronome mode, the synchronisation mode or the energy level.

If the user does not press the softkeys [Metronome], [Energy] or [Sync] within three seconds or if the user presses another softkey, the softkey context menu disappears automatically and the highlighted selection is adopted.

### 7.3.1 Softkey Context Menu Metronome

The metronome of the corpuls1 supports the user acoustically during cardio-pulmonary resuscitation by means of compression- and ventilation tones. The metronome is available in AED mode and in manual mode.

To access the softkey context menu Metronome, proceed as follows:

1. Press the softkey [Metronome] several times, if necessary.

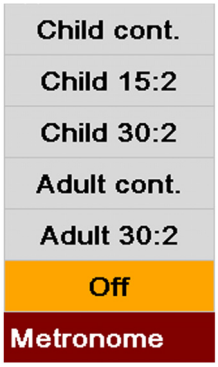



Fig. 7-2 Softkey Context Menu Metronome

The metronome mode has been selected and the corpuls1 shows this mode in the defibrillator user interface.

The metronome is audible.

### 7.3.2 Softkey Context Menu Synchronisation Option

The softkey context menu Sync allows to set synchronisation options for synchronised shock release in manual mode.

The softkey [Sync] is only available in manual mode.

To access the softkey context menu Sync, proceed as follows:

1. Press the softkey [Sync] several times, until the required value is reached.

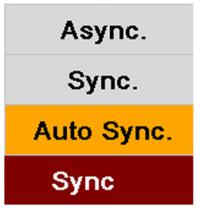



Fig. 7-3 Softkey Context Menu Synchronisation

The synchronisation option has been selected and the corpuls1 shows this option in the defibrillator user interface.

### 7.3.3 Softkey Context Menu Shock Energy

The softkey context menu Energy allows selection of the energy level in defibrillation mode.

To access the softkey context menu Energy, proceed as follows:

1. In AED mode: Press softkey [Energy] once.

   In manual mode: Press softkey [Energy] twice, on different positions, respectively.

2. To configure the energy level, the following options are available:

   a) Press the softkey [Energy] several times until the required value is reached.

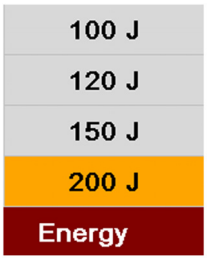



Fig. 7-4 Softkey context menu Energy

Only available in AED mode, if configured by the user OPERATOR.

b) In manual mode: Press the softkey [Energy]. To configure the energy level, press softkey [Up] or [Down].

3. Press the softkey [OK] in manual mode.
   The energy level has been selected and is displayed in the defibrillator user interface.

## 7.4 Charging the Defibrillator

In both defibrillation modes the user has to deliver the shock with the set energy level (see 10.7 Defibrillation and Cardioversion on page 86). In manual mode, the user first has to charge the set shock energy with the softkey [Charge].

Defibrillation with shock paddles (see 10.7.9 Performing Defibrillation and Cardioversion in Manual Mode with Shock Paddles on page 95).

To charge the defibrillator in manual mode, proceed as follows:

1. Press the softkey [Charge].
   The corpuls1 charges the set energy level. The user can see the charging progress on the white bar.

## 7.5 CPR Feedback (Option)

The CPR Feedback function (option) assists the user with cardiopulmonary resuscitation providing important information on the quality of the thorax compressions. The function provides information on the compression rate and -depth of the thorax compressions during resuscitation.

The function CPR Feedback is available in the following application areas:

- AED mode
- Manual defibrillation mode
- Monitoring mode

### 7.5.1 Application Note corPatch CPR

The corpuls1 displays an Application note, consisting of an illustration and text ⟨Attach corPatch CPR Sensor⟩.

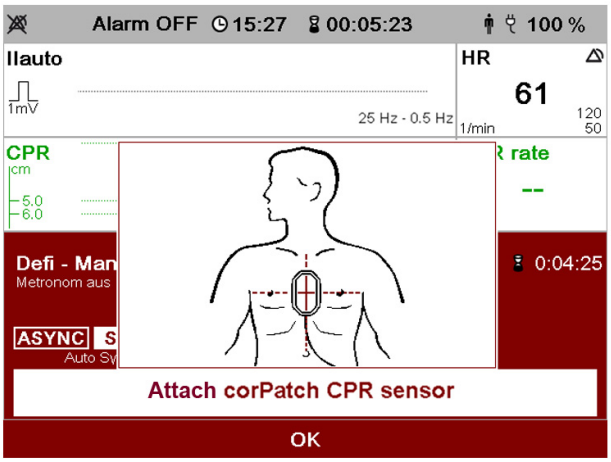



Fig. 7-5 Application note corPatch CPR disposable sensor

These application notes are issued in the following situations:

- When the corPatch CPR disposable sensor is plugged in, but not positioned correctly and not supplying measuring values.
- In AED mode after a recommendation for shock and released first shock or if the first analyse result is not a recommendation for shock.
- In manual mode, the device reminds the user of the sensor after the first shock or three minutes after starting the manual mode.

To close the corPatch CPR application note , proceed as follows:

1. Press softkey [OK].

## 7.5.2 primeCPR Application note

An application note for the primeCPR feedback sensor is shown on the screen of the device.

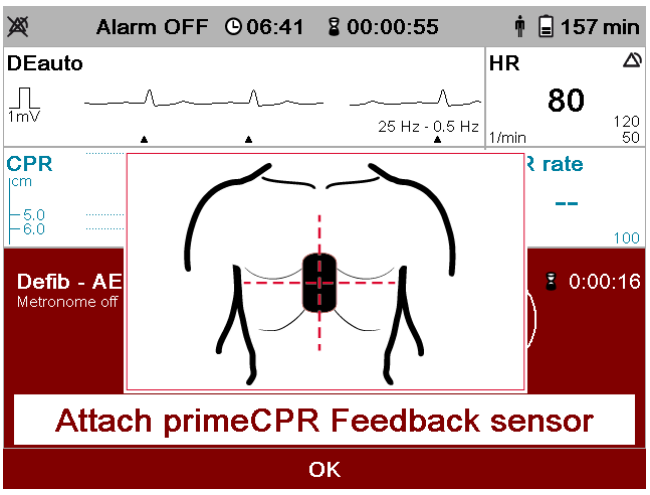



Fig. 7-6 CPR Feedback sensor

The application note appears in the following situations:

- The plug connection of the CPR Feedback sensor is faulty, no readings are transmitted
- After the first shock is released (AED mode, manual mode)
- First analysis result does not recommend shock (AED mode)
- Three minutes after starting the manual mode

Press the softkey [OK] to make the note disappear and return to the display.

## 7.6 Switching to Monitoring Mode

The user can close the defibrillation mode and switch to monitoring mode.

To switch to monitoring mode, proceed as follows:

1. Press the softkey [Monitor].
   The corpuls1 is in monitoring mode.

# 8 User Interface in Pacer Mode (Option)

This chapter shows the user interface and instructs the user how to operate the corpuls1 in optional pacer mode. The corpuls1 allows pacer therapy on the patient in the pacer modes FIX and DEMAND.

## 8.1 Structure of the user interface

The following illustration shows the user interface in pacer mode.

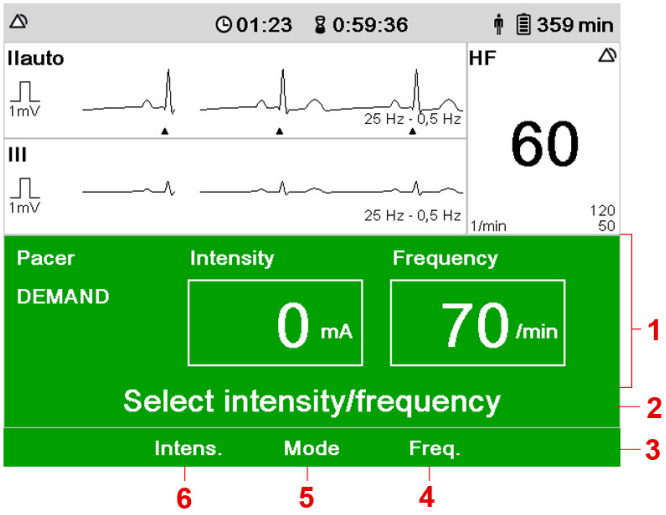



Fig. 8-1 Structure of the user interface in pacer mode (Example: DEMAND mode)

| Item | Element | Description |
|---|---|---|
| 1 | Pacer user interface | Shows available parameters of the pacer mode. |
| 2 | Message line | Indicates a message. |
| 3 | Softkey line | Indicates the current assignment of the softkeys. |
| 4 | Softkey [Freq.] | Allows to select the required stimulation frequency (see 8.5 Frequency on page 64). |
| 7 | [Mode] softkey | Allows to select a pacer mode (FIX/DEMAND) (see 8.4 Pacer Mode on page 64). |
| 8 | Softkey [Intens.] | Allows to select the required stimulation intensity (see 8.3 Intensity on page 64). |

Tab. 8-1 Structure of the user interface in pacer mode (Example: DEMAND mode)

The corpuls1 allows to show two curve fields and a maximum of two vital parameter fields in pacer mode.

The curve field 1 is not configurable and shows the lead Auto II/DE. The curve field 2 and one vital parameter field depend on the settings configured by the user OPERATOR.

The symbols ▲, ♥, ♥, ◆ have the same meaning as in monitoring mode.

In pacer mode the user cannot open or configure curve context menus or vital parameter fields.

## 8.2 Main menu

The user can open the main menu in every operating mode.

To be able to access the submenu item Pacer from the main menu (see 13.3 Menu item Pacer (option) on page 147) the user has to call up the pacer mode.

To open the main menu in pacer mode, proceed as follows:

1. Hold down the key/softkey **Main menu** for three seconds (see 6.2.1 Opening the Main Menu on page 43).

   The main menu has been opened.

## 8.3 Intensity

The user can configure the stimulation intensity in pacer mode.

To set the intensity, proceed as follows:

1. Press softkey [Intens.].
2. Press softkey [Up] or [Down] until the required value is reached.

   The field Intensity is highlighted in white and shows the required value.
3. To save the settings, press softkey [OK].

   The intensity has been selected and shows the current value.

   The menu is closed. The settings will be stored until the user switches off the corpuls1. The intensity has been selected and the green field Intensity shows the current value.

To retain the previous settings and close the menu, press the softkey [Cancel].

## 8.4 Pacer Mode

The corpuls1 has the pacer modes FIX and DEMAND.

To select a pacer mode, proceed as follows:

1. Press the softkey [Mode].

   The softkey line shows the pacer modes FIX and DEMAND.
2. Press the softkey [FIX] or [DEMAND].

   The selected pacer mode is highlighted in grey and is displayed as current mode.
3. Press softkey [OK].

   The previously selected pacer mode FIX or DEMAND is displayed as current mode.

## 8.5 Frequency

The user can set the stimulation rate in pacer mode.

To set the stimulation frequency, proceed as follows:

1. Press the softkey [Freq.].

   The softkey line shows the softkeys [Up], [Down].
2. Press the softkey [Up] or [Down] until the required value has been reached.

   The field Frequency is highlighted in white and shows the selected value.
3. To save the settings, press softkey [OK].

   The menu is closed. The settings will be stored until the user switches off the corpuls1.

   The stimulation frequency has been selected and shows the current value.

To retain the previous settings and close the menu, press the softkey [Cancel].

## 8.6 Application note Pacer

When the user calls up the pacer mode, the application note ⟨Recommended electrode placement⟩ appears, consisting of an illustration and text.

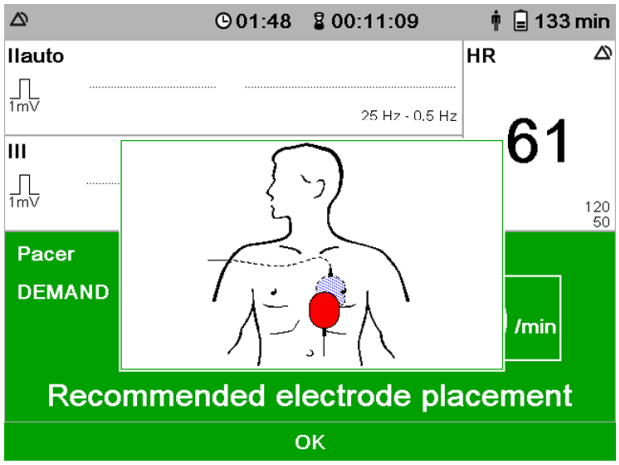



Fig. 8-2 Application note Pacer

To close the application note Pacer , proceed as follows:

1. Press softkey [OK].

## 8.7 Switching to Monitoring Mode

The user can switch between pacer mode and monitoring mode, without having to interrupt pacer therapy.

In monitoring mode the message ⟨STIM⟩ is displayed in different ways, depending on the pacer status (see 10.8.3 Overview Pacer mode on page 100).

To switch to monitoring mode, proceed as follows:

1. Press the **Pacer** key.
   The corpuls1 is in monitoring mode.

# 9 Operation Monitoring

The corpuls1 allows to monitor the condition of critical cardiac patients over an extended period of time.

Besides ECG monitoring and optional pulse oximetry monitoring the physiological alarms of the corpuls1 alarm system (see 4.7 Alarm Design on page 31) pertain to the patient monitoring functions.

## 9.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Distorted ECG representation due to nerve stimulator, implanted pacer or soiled skin!

Can lead to misinterpretation of the ECG and wrong diagnosis.

- ► When using a nerve stimulator, if an implanted pacer is present or in case of dysrhythmias, mind their influence on the representation of the ECG.
- ► To improve the adhesion of the electrodes, remove excessive hair from the patient's skin, clean and dry the patient's skin.
- ► Do not wet the electrodes with additional electrode gel.

**⚠ WARNING!**

Disturbance of the heart rate indication by an implanted pacer!

The heart rate display may be corrupted in patients with implanted pacers in that cardiac pacing pulses are detected when cardiac arrest or certain arrhythmias occur. Can lead to misinterpretation and wrong diagnosis.

- ► Keep pacer patients under close surveillance.
- ► Inform yourself in this user manual about the performance of the corpuls1.

## 9.2 Patient group

The corpuls1 allows monitoring of the patient groups adult, child and neonate.

ECG electrodes and ECG monitoring cable can be used for all patient groups.

The pulse oximetry intermediate cable can be used for all patient groups. A selection of different sensors are available for the different patient groups (e. g. finger sensor/disposable sensor/ear clip sensor adults, fingersensor/disposable sensor child, disposable sensor neonate).

## 9.3 Connecting Monitoring Accessories to the Device

The user can connect electrodes and sensors for monitoring if the corresponding interface is installed at the corpuls1.

### 9.3.1 ECG electrodes (accessories)

To connect ECG electrodes, proceed as follows:

1. Connect (item A) the plug of the ECG monitoring cable (item 2) to the interface ECG-M (item 1). Make sure to orient the plug correctly.


Fig. 9-1 Connect ECG electrodes (picture shows interface variant without CPR Feedback)

1 Interface ECG-M
2 Plug of ECG monitoring cable

The message ⟨ECG cable connected⟩ appears.

### 9.3.2 Pulse oximetry sensor (Accessories)

The oximetry interface allows to connect a pulse oximetry sensor. To connect a pulse oximetry sensor, a pulse oximetry intermediate cable is necessary.

To connect the pulse oximetry sensor with the pulse oximetry intermediate cable, proceed as follows:

1. Connect (item A) the plug of the pulse oximetry intermediate cable (item 2) to the plug of the pulse oximetry sensor cable (item 3).

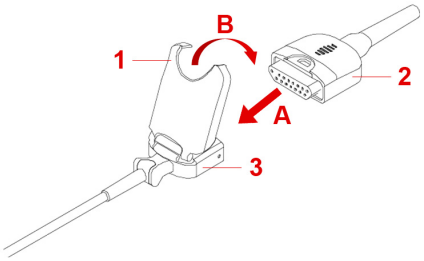



Fig. 9-2 Connect the pulse oximetry sensor to the pulse oximetry intermediate cable

1 Clip
2 Plug of pulse oximetry intermediate cable
3 Plug of pulse oximetry sensor cable

2. Close (item B) the clip (item 1).

To separate the pulse oximetry sensor from the pulse oximetry intermediate cable, open the clip upwards and disconnect the plugs.

For connecting pulse oximetry sensors there are two variants:

- Pulse oximetry
- Extended Pulse oximetry (Masimo rainbow SET® Technology)

To connect a pulse oximetry sensor, proceed as follows:

1. Connect (item A) the plug of the pulse oximetry intermediate cable (item 1) to the Oximetry interface (item 2), make sure to orient the plug correctly.

   The message ⟨Oximetry cable connected⟩ appears.

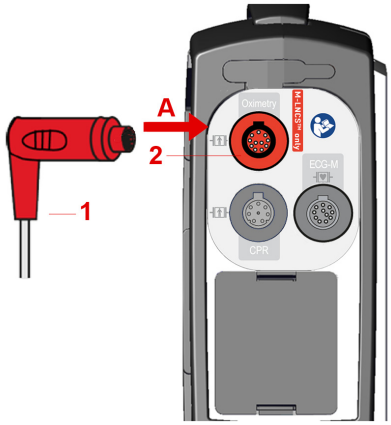



Fig. 9-3 Varian pulse oximetry


Fig. 9-4 Variant extended pulse oximetry

1 Plug of pulse oximetry intermediate cable
2 Interface Oximetry

## 9.4 Preparing the Patient

Before the user attaches electrodes to the patient, the patient has to be prepared.

To prepare the patient, proceed as follows:

1. If necessary, remove excessive hair from where the electrodes will be attached.
2. If necessary, clean and dry the skin where the electrodes will be attached.

## 9.5 Attaching electrodes and sensors to the patient

When the user has connected electrodes and sensors to the corpuls1, the user can attach electrodes and sensors to the patient.

### 9.5.1 ECG electrodes (accessories)

To start ECG monitoring, the user has to attach the 4-pole ECG monitoring cable and ECG electrodes to the patient. There are two variants to attach ECG electrodes to the patient. The user has to choose variant A or variant B and connect all ECG electrodes according to the selected variant.

To attach the ECG electrodes of the 4-pole ECG monitoring cable to the patient, proceed as follows:

Requirements:

✓ The 4-pole ECG monitoring cable is connected (see 9.3.1 ECG electrodes (accessories) on page 67)

✓ The patient is prepared (see 9.4 Preparing the Patient on page 68)

1. Variant A: Attach ECG electrode under the right clavicle (item 1). Attach red R clip to ECG electrode.

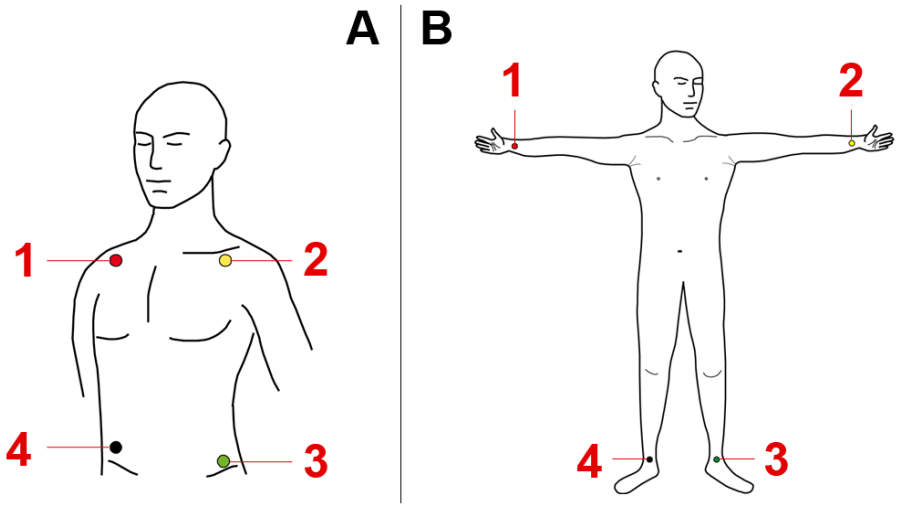



Fig. 9-5 Attaching ECG electrodes to the patient

1 ECG electrode with red R clip
2 ECG electrode with yellow L clip
3 ECG electrode with green F clip
4 ECG electrode with black N clip

Variant B: Attach ECG electrode to right arm (item 1). Attach red R clip to ECG electrode.

2. Variant A: Attach ECG electrode under the left clavicle (item 2). Attach yellow L clip to ECG electrode.

   Variant B: Attach ECG electrode to left arm (item 2). Attach yellow L clip to ECG electrode.

3. Variant A: Attach ECG electrode to the area of the left inguinal fold; central to the axis of the leg (item 3). Attach green F clip to ECG electrode.

   Variant B: Attach ECG electrode to left leg (item 3). Attach green F clip to ECG electrode.

4. Variant A: Attach ECG electrode to the area of the right inguinal fold; central to the axis of the leg (item 4). Attach black N clip to ECG electrode.

   Variant B: Attach ECG electrode to right leg (item 4). Attach black N clip to ECG electrode.

   ECG monitoring starts (see 9.6.2 Starting ECG Monitoring on page 70).

If the black N clip is loose, the corpuls1 does not issue an alarm.

If the green F clip is loose, the corpuls1 issues, for reasons of patient safety, an alarm for the green F clip, the yellow L clip and the red R clip (see 16 Alarms and Messages on page 176).

### 9.5.2 Pulse oximetry sensor (Accessories)

To start pulse oximetry monitoring, the user has to attach a pulse oximetry sensor to the patient.

To attach the pulse oximetry sensor to the patient, proceed as follows:

Prerequisite:

✓ The pulse oximetry sensor is connected (see 9.3.2 Pulse oximetry sensor (Accessories) on page 67)

1. Attach the pulse oximetry sensor to the patient according to the instructions in the user manual of the pulse oximetry sensor.

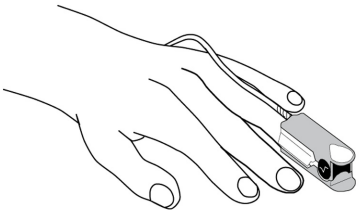


Fig. 9-6 Attaching the pulse oximetry sensor (Example: finger sensor)

Pulse oximetry monitoring starts (see 9.7.3 Starting Pulse Oximetry Monitoring on page 73).

## 9.6 ECG monitoring

ECG monitoring allows a routine surveillance of the heart rhythm and the heart rate of the patient.

An ECG monitoring cable allows to obtain the following extremity leads:

- Bipolar extremity leads according to Einthoven (I, II, III).
- Unipolar extremity leads according to Goldberger (aVR, aVL, aVF).

The depolarisation wave is a spatial unit, i..e. that the beginning of one wave is not visible in all derivations at the same time. Isoelectric sections at the beginning of an QRS complex are treated as part of the following significant wave. Analogously, isoelectric segments at the end of the QRS complex are incorporated into the previous significant wave.

### 9.6.1 Colour coding ECG monitoring cable

The colour coding in the illustrations of the clips of the ECG monitoring cable in the user manual refer to Code 1 (common in Europe according to IEC) and Code 2 (common in the U.S. according to AHA) of the DIN EN 60601-2-51.

| | CODE 1 | | CODE 2 | |
|---|---|---|---|---|
| Lead | Designation of the clip | Colour coding | Designation of the clip | Colour coding |
| Extremity leads according to Einthoven and Goldberger | R | Red | RA | White |
| | L | Yellow | LA | Black |
| | F | Green | LL | Red |
| Neutral | N | Black | RL | Green |

Tab. 9-1 Colour coding of the clips of the 4-pole ECG monitoring cable

For all representations of the ECG leads in this user manual see CODE 1 (conventionally used in Europe pursuant to IEC).

### 9.6.2 Starting ECG Monitoring

If the following prerequisites are met, the user can start ECG monitoring.

To start ECG monitoring, proceed as follows:

Prerequisite:

✓ The corpuls1 is switched on

1. Attach the ECG electrodes to the patient (see 9.5.1 ECG electrodes (accessories) on page 69).
   ECG monitoring starts.

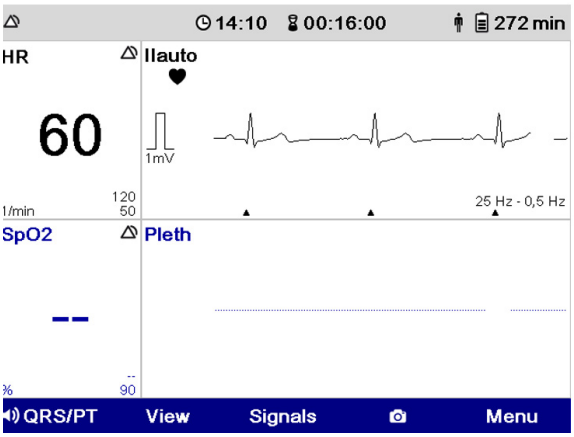



Fig. 9-7 ECG monitoring (Example: monitoring mode)

The symbol ▲ in the curve field indicates a QRS marker. In the configuration dialogue of the main menu (see 12.5 Menu item ECG on page 122) under menu item ECG the QRS marks can be disabled.

The black flashing symbol ♥ in the curve field indicates a QRS complex. In time with the flashing symbol, the corpuls1 issues a QRS tone which can be disabled with the softkey [QRS/PT].

QRS tone and QRS marker may deviate slightly from each other.

## 9.7 Pulse oximetry (option)

Pulse oximetry is a non-invasive monitoring method for continuous measurement of the peripheral arterial oxygen saturation and other vital parameters.

To increase patient safety and to be able to guarantee measurement accuracy, oximetry sensors and intermediate cables were equipped with X-CAL technology. The corpuls1 supports this function and issues alarms of different priorities to indicate that the oximetry sensor will expire soon (low priority) or that the oximetry sensor is expired (medium priority).

### 9.7.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

Further safety information pertaining to pulse oximetry monitoring can be found in the Appendix (see XIII Masimo Safety Information on page 244).

**⚠ WARNING!**

Wrong readings due to ionising (radioactive) radiation!

Can lead to wrong therapy of the patient.

► Do not operate the corpuls1 in the vicinity of of ionising (radioactive) radiation.

**CAUTION**

Inaccurate readings due to stray light!

Displayed readings can differ from actual readings. Bright sunlight, Xenon OP lamps or a photodynamic therapy with bilirubin lamps may influence the accuracy of the oximetry measurement.

► If necessary, protect the pulse oximetry sensor from straylight by using an ambient shield (see VI Approved accessories and consumables on page 210).

**CAUTION**

Low levels of $SpO_2$ due to elevated levels of SpMet!

At SpMet levels of approx. 10 % - 15 % the levels of $SpO_2$ are lower. At higher levels of SpMet, the levels of $SpO_2$ may tend to read in the low to mid-80 %.

► If elevated levels of SpMet are suspected, a blood sample of the patient should be analysed in the laboratory.

**CAUTION**

Elevated levels of $SpO_2$ due to elevated levels of SpHb!

SpHb values above normal tend to increase the level of $SpO_2$. The increase of the $SpO_2$ levels corresponds approximately to the amount of SpHb that is present.

► If elevated levels of SpHb are suspected, a blood sample of the patient should be analysed in the laboratory.

**WARNING!**

Wrong application of the oximetry sensor!

Application at temperatures of more than +41 °C (+105.8 °F) and/or too high apply pressure can lead to skin lesions.

► Apply the sensor without excessive pressure, especially in patients with sensitive skin.

**CAUTION**

Too long application of the oximetry sensor at a measuring point!

If the oximetry sensor is used too long at a measurement site, reliable oximetry monitoring in the patient is not ensured.

► The maximum application time of an oximetry sensor at one measurement site is 4 h.

**CAUTION**

Non-approved accessories!

Can cause inefficiency or malfunctions in the device for pulse oximetry monitoring.

► Only use accessories supplied by or approved by the manufacturer (see VI Approved accessories and consumables on page 210).

### 9.7.2 Pulse oximetry measuring options

The availability of the extended pulse oximetry measuring options of Masimo rainbow® SET Technology Masimo depends on how the corpuls1 is configured and what type of pulse oximetry sensor is used. The licensing model allows service technicians to activate available pulse oximetry measuring options.

Older Masimo SET pulse oximetry sensors can only be used in combination with a special adapter cable (see VI Approved accessories and consumables on page 210).

The following table shows available pulse oximetry measuring options.

| Pulse oximetry measuring option | Mission | Unit |
|---|---|---|
| $SpO_2$ | Allows to measure peripheral oxygen saturation. | % |
| SpCO | Allows to measure carbon monoxide levels. | % |
| SpHb | Allows to measure total haemoglobin levels. | g/dl or mmol/l,<br>in relation to monomeric Hb levels Hb(Fe), according to IUPAC and DIN 58931. |
| SpMet | Allows to measure methaemoglobin levels. | % |
| PR | Allows to measure the peripheral pulse rate. | 1/min |
| PI | Allows to measure the perfusion index. By means of the perfusion index, the user can estimate the strength of the pulse. The perfusion index has a range from 0.02% up to 20%. The perfusion index gives information about the percentage of the pulsating blood volume. | % |

Tab. 9-2 Pulse oximetry measuring options

The user cannot measure SpCO- and SpHb values at the same time. For the measurement of SpCO- and SpHb values different pulse oximetry sensors are necessary.

### 9.7.3 Starting Pulse Oximetry Monitoring

If the following prerequisites are met, the user can start pulse oximetry monitoring.

To start pulse oximetry monitoring, proceed as follows:

Prerequisite:

✓ The corpuls1 is switched on

1. Attach the pulse oximetry sensor to the patient (see 9.5.2 Pulse oximetry sensor (Accessories) on page 70).

   The symbol in the vital parameter field indicates the calibration of the pulse oximeter. The readings are still unreliable.

The calibration of the oximeter for SpCO-, SpHb- and SpMet measurement can take up to 120 s.

   The symbol disappears from the vital parameter field. Pulse oximetry monitoring starts.

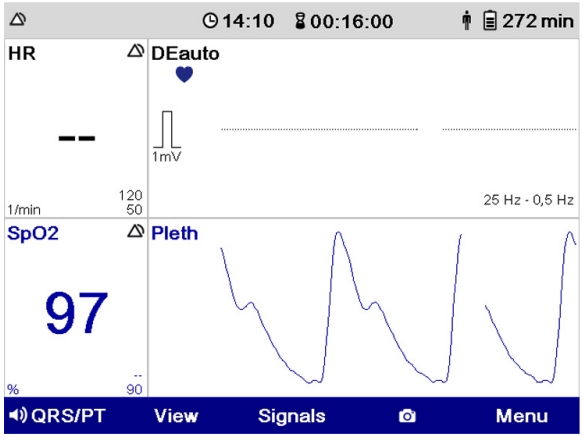



Fig. 9-8 Pulse oximetry monitoring (Example: monitoring mode)

The blue flashing symbol in the curve field indicates the heart rate measured via the pulse oximetry sensor. In time with the flashing symbol, the corpuls1 issues a pulse tone which can be disabled with the softkey [QRS/PT].

To guarantee adequate perfusion, integrity of the skin and correct alignment of the sensor, check the measuring site of the pulse oximetry sensor regularly, at least every four hours. In patients with poor perfusion, the measuring site has to be checked at least every two hours.

If the plethysmogramme shows artefacts, check the position of the pulse oximetry sensor at the measuring site and correct, if necessary.

# 10 Operation – Therapy

The corpuls1 allows to perform therapy on the patient.

## 10.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Wrong placement of therapy electrodes in pacer patients!

Can lead to irreversible damage to the myocardium in patients with implanted pacers, if the shock is conducted via the implanted pacer electrode.

- ► Do not place therapy electrodes directly over the pacer unit.
- ► If the therapy electrodes would be near the pacer unit, choose the reversed position: below the left clavicula parasternally and below the right mamilla, approx. 5th intercostal space at the level of the apex of the heart.

**⚠ WARNING!**

Faulty ECG results due to shock, vibration, artificial respiration or external pacers!

If the ECG analysis lasts too long, the results may be incorrect and may lead to misinterpretation of the ECG. This may cause diagnostic errors and as a result incorrect treatment.

- ► Do not touch patient during ECG analysis.
- ► Avoid external commotion and vibration during ECG analysis to avoid motion artefacts.
- ► Briefly discontinue artificial ventilation during ECG analysis.
- ► In patients with pacers, check the vital signs.

**⚠ WARNING!**

Distorted ECG representation due to nerve stimulator, implanted pacer or soiled skin!

Can lead to misinterpretation of the ECG and wrong diagnosis.

- ► When using a nerve stimulator, if an implanted pacer is present or in case of dysrhythmias, mind their influence on the representation of the ECG.
- ► To improve the adhesion of the electrodes, remove excessive hair from the patient's skin, clean and dry the patient's skin.
- ► Do not wet the electrodes with additional electrode gel.

**⚠ WARNING!**

Wrong therapy master cable!

Can lead to therapy failure.

- ► Connect the correct therapy master cable (P/N 04326.0BA).

**WARNING!**

Wrong net filter configuration!

Electromagnetic fields can impair the rhythm detector and thus the analysis i AED mode, so that the shock release may not be possible.

► Have the operator check if the net filter configuration is correct.

**WARNING!**

Insufficient effectiveness of therapy electrodes during therapy!

If the corPatch easy therapy electrodes are not fully effective, a correct defibrillator/pacer therapy on the patient may not be guaranteed or the patient may suffer serious burns.

► Follow all safety instructions on the packaging of the corPatch easy therapy electrodes.

► Do not open pouch until ready for use.

► If the packaging is damaged or has previously been opened, do not use the corPatch easy therapy electrodes.

► Do not use corPatch easy therapy electrodes if the expiry date indicated on the packaging has passed.

► Do not use the corPatch easy therapy electrodes if they are damaged.

► Do not crush, bend, fold or store the corPatch easy therapy electrodes under heavy objects.

► If the gel has dried, do not use the corPatch easy therapy electrodes.

► Do not use additional gel on corPatch easy therapy electrodes.

► Do not overlap the corPatch easy therapy electrodes.

► Use separate ECG electrodes when performing non-invasive pacing.

► Do not discharge shock paddles over corPatch easy therapy electrodes.

► Keep the corPatch easy therapy electrodes clear of other electrodes or metal parts in contact with the patient.

► Avoid contact between body parts of the patient, such as exposed skin on the head or limbs, with conductive fluids such as gel, blood, saline, and metal objects such as bed frames or stretchers.

**NOTICE**

Disruption of non-defibrillation-protected application parts of other medical devices during defibrillation!

Other medical devices with non-defibrillation-protected application parts may be damaged by the energy delivered from corpuls1.

► Disconnect non-defibrillation-protected application parts of other medical equipment during defibrillation.

If the corpuls1 fails, proceed according to local resuscitation protocols.

## 10.2 Patient group

The corpuls1 allows therapy of the patient groups adult, child and neonate.

Which patient group can be treated depends on the kind of therapy electrode (see 10.3 Overview Therapy Electrodes on page 77).

Depending on which type of therapy electrodes is connected, the corresponding patient group is displayed in the softkey line.

Example: If shock paddles are connected, the corpuls1 displays patient classes Adult, Child and Neonate are displayed, or, if corPatch easy Pediatric/Pediatric Extended electrodes are connected, patient classes Child and Neonate are displayed.

The patient group can be selected as follows:

- After connecting the therapy electrode to the device (see 10.4 Connecting Therapy Accessories on page 77)
- In the main menu (see 12.8.2 Submenu item Patient class/-group on page 128)

## 10.3 Overview Therapy Electrodes

The following table describes the available therapy electrodes:

| Therapy Electrode | Scope of application | Patient Population |
|---|---|---|
| corPatch easy pre-connected | Defibrillation in AED Mode | Adults from 20 kg body weight |
| | Defibrillation and cardioversion in manual mode | |
| | ECG monitoring | |
| | Pacer therapy | |
| corPatch easy Pediatric/ corPatch easy Pediatric Extended | Defibrillation in AED Mode | Neonates and children up to 25 kg body weight |
| | Defibrillation and cardioversion in manual mode | |
| | ECG monitoring | |
| | Pacer therapy | |
| Shock paddles | Defibrillation and cardioversion in manual mode | Adults and children from 5 kg body weight |
| | ECG monitoring | |
| Shock paddles with baby shock electrodes | Defibrillation and cardioversion in manual mode | Neonates up to max. 5 kg body weight |
| | ECG monitoring | |
| Shock spoons | Defibrillation and cardioversion in manual mode | Adults and children with different shock spoon sizes A, B, C |
| | ECG monitoring | |

Tab. 10-1 Overview Therapy Electrodes

The shock paddles must be connected together with the therapy master cable, as this one connects both individual shock paddles.

Always connect the shock spoons with the pertaining Y adapter, as this one connects both individual shock spoon electrodes via the respective shock spoon holder.

## 10.4 Connecting Therapy Accessories

This chapter describes how to connect therapy accessories to the device.

### 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories)

With the therapy socket it is possible to connect corPatch easy electrodes or shock paddles.

Shock paddles must be used in combination with the therapy master cable.

To connect the shock paddles to the therapy master cable, proceed as follows:

Prerequisite:

✓ For operation as defibrillator shock paddles instead of corPatch easy electrodes are recommended

✓ Shock paddles and therapy master cable are present

1. Connect (item A) the black plug of the shock paddles (item 2) to the red plug of therapy master cable (item 1).

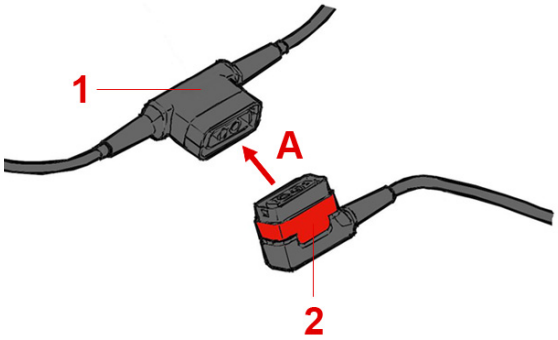



Fig. 10-1 Connecting shock paddles to the therapy master cable

1 Plug of shock paddles

2 Red plug of therapy master cable

The plug of the shock paddles engages with a click and the shock paddles are connected to the therapy master cable.

Connect the corPatch easy electrodes directly to the corpuls1. Shock paddles must only be used in combination with the therapy master cable.

To connect corPatch easy electrodes or the therapy master cable to the device, proceed as follows:

1. Connect (item A) the black plug of the therapy electrodes or the therapy master cable (item 2) to the therapy socket (item 1).

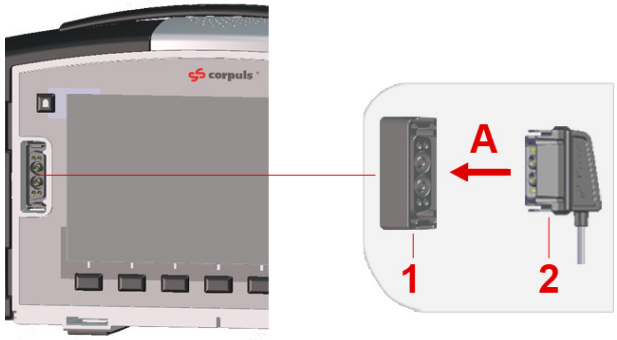



Fig. 10-2 Connect corPatch easy electrodes or the therapy master cable

1 Therapy socket

2 Plug of the therapy electrodes or black plug of the therapy master cable

The message ⟨Therapy cable connected, select patient class⟩ appears.

2. Select the patient class/-group depending on the connected corPatch easy electrodes with the softkeys [Adult]/[Child]/[Neonate]. Alternatively, select the patient class/-group via the configuration dialogue (see 12.8.2 Submenu item Patient class/-group on page 128).

   The corPatch easy electrodes or the therapy master cable are connected to the corpuls1.

### 10.4.2 Shock Spoons (Accessories)

The therapy socket allows to connect shock spoons.

The shock spoons consist of shock spoon electrodes, shock spoon holders and the pertaining Y-adapter for connecting to the corpuls1 (see Shock Spoon manual, P/N: 04137).

Before using the shock spoons, read and understand the additional user manual (P/N 04137).

To connect the shock spoons with the Y-adapter to the corpuls1, proceed as follows:

Prerequisite:

✓ The shock spoon electrodes are connected with the holder and the pertaining Y-adapter.

1. Connect (item A) the black plug of the Y-adapter (item 2) to the therapy socket (item 1).

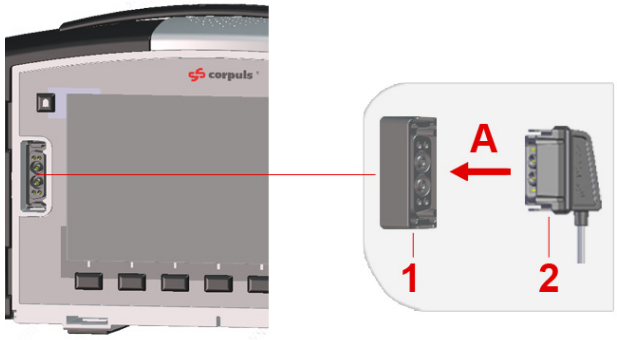



Fig. 10-3 Connect corPatch easy electrodes or the therapy master cable

1 Therapy socket

2 Plug of the therapy electrodes or black plug of the therapy master cable

Shock spoons are connected to the corpuls1.

### 10.4.3 corPatch CPR disposable sensor (Accessories)

Socket CPR allows to connect a corPatch CPR disposable sensor.

To connect the corPatch CPR disposable sensor to the corPatch CPR intermediate cable, proceed as follows:

Prerequisite:

✓ The corPatch CPR disposable sensor and -intermediate cable are present.

1. Connect the connector of the corPatch CPR disposable sensor (item 1) to the connector of the corPatch CPR intermediate cable (item 2).

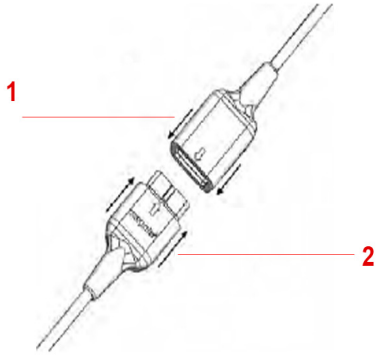



Fig. 10-4 Connect the corPatch CPR disposable sensor to the corPatch CPR intermediate cable.

1 Connector corPatch CPR disposable sensor

2 Plug of corPatch CPR intermediate cable

The plug of the corPatch CPR disposable sensor clicks into place and the corPatch CPR disposable sensor is connected to the corPatch CPR intermediate cable.

To connect the corPatch CPR disposable sensor to the device, proceed as follows:

1. Connect (item A) the plug of the corPatch CPR intermediate cable (item 1) to the CPR interface (item 2).

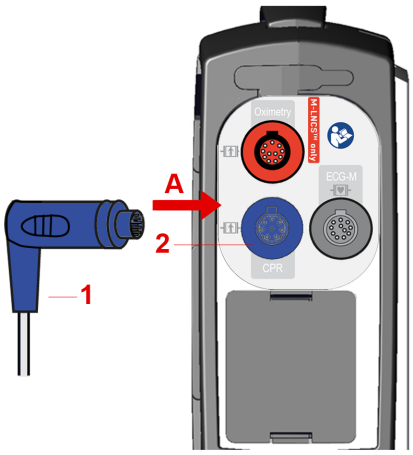



Fig. 10-5 Connecting the corPatch CPR disposable sensor

1 Plug of corPatch CPR intermediate cable

2 CPR interface

The message ⟨CPR sensor cable connected⟩ appears.

### 10.4.4 Connecting the primeCPR Feedback Sensor (Accessory)

primeCPR easy feedback sensor

To connect the primeCPR easy feedback sensor (disposable), an intermediate cable is necessary..

To connect the primeCPR easy feedback sensor to the device, proceed as follows:

Prerequisite:

✓ primeCPR easy intermediate cable (P/N 04235.50) is present

✓ primeCPR easy feedback sensor (P/N 04235.5) is present

1. Connect the primeCPR easy feedback sensor to the intermediate cable.
   The plugs snap into place with an audible click.
2. Connect (item A) the plug of the primeCPR easy intermediate cable (item 1) to the CPR interface (item 2). Make sure to orient the plug correctly.

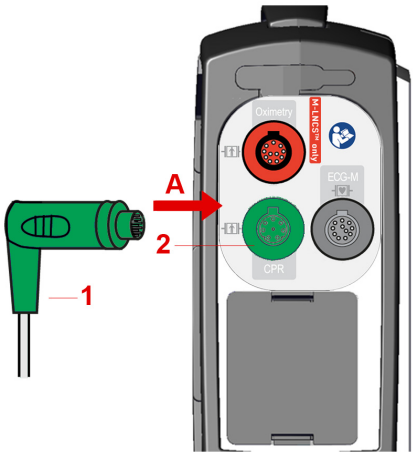



Fig. 10-6 Connecting the primeCPR easy feedback sensor

1 Plug of primeCPR easy intermediate cable

2 CPR interface

The message ⟨CPR sensor cable connected⟩ appears.

Make sure to connect only plugs and sockets of the same colour.

primeCPR feedback sensor

To connect the primeCPR feedback sensor (reusable) to the device, proceed as follows:

Prerequisite:

✓ primeCPR feedback sensor (P/N 04235.4) is present

1. Connect (item A) the plug of the primeCPR feedback sensor (item 1) to the CPR interface (item 2). Make sure to orient the plug correctly.

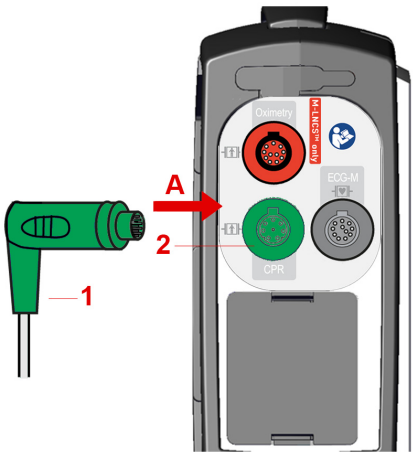



Fig. 10-7 Connecting the primeCPR feedback sensor

1 Plug primeCPR feedback sensor
2 CPR interface

The message ⟨CPR sensor cable connected⟩ appears.

Make sure to connect only plugs and sockets of the same colour.

## 10.5 Preparing the Patient

Before the user attaches electrodes to the patient, the patient has to be prepared.

To prepare the patient, proceed as follows:

1. If necessary, remove excessive hair from where the electrodes will be attached.
2. If necessary, clean and dry the skin where the electrodes will be attached.

## 10.6 Attaching therapy electrodes to the patient

If the user has connected the therapy electrodes to the corpuls1, the user can attach the therapy electrodes to the patient.

### 10.6.1 Connecting corPatch easy Electrodes for Defibrillation and Cardioversion to the Patient

To be able to perform therapy, the user has to apply the corPatch easy therapy electrodes to the patient.

To attach the corPatch easy electrodes to the patient, proceed as follows:

Prerequisite:

✓ Therapy electrodes are connected (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77)

✓ The patient is prepared (see 10.5 Preparing the Patient on page 82)

1. Open the package of the corPatch easy electrodes and take out the corPatch easy electrodes.
2. Attach the red-labelled electrode to the right of the sternum on the thorax (item 1).

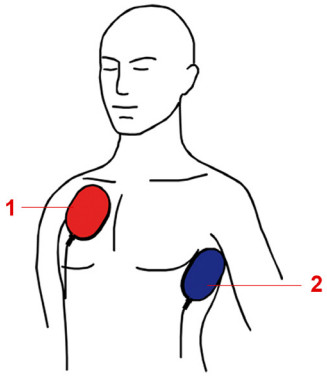



Fig. 10-8 Connecting corPatch easy electrodes for defibrillation and cardioversion to the patient

1 Red-labelled electrode
2 Blue-labelled electrode

Apply the electrodes from the centre outwards so that no air pockets are included.

3. Attach the blue-labelled electrode beside apex of the heart on the lower left of the thorax (item 2).

   The corPatch easy electrodes have been attached to the patient.

### 10.6.2 Attaching corPatch easy Electrodes to the Patient

To be able to perform therapy, the user has to apply the corPatch easy therapy electrodes to the patient.

To attach the corPatch easy electrodes to the patient, proceed as follows:

Prerequisite:

✓ Therapy electrodes are connected (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77)

✓ The patient is prepared (see 10.5 Preparing the Patient on page 82)

1. Open the package of the corPatch easy electrodes and take out the corPatch easy electrodes.

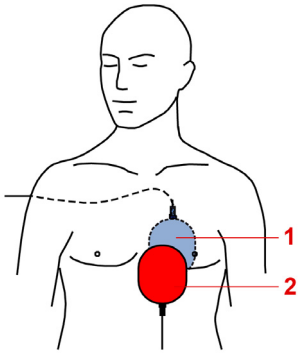



Fig. 10-9 Attaching corPatch easy electrodes to the patient

1 Red-labelled electrode
2 Blue-labelled electrode

Apply the electrodes from the centre outwards so that no air pockets are included.

2. Place the red-labelled electrode on the thorax at the level of the bottom third of the sternum (item 2).
3. Place the blue-labelled electrode on the back beside the vertebral column beneath the left shoulder blade (item 1).

corPatch easy electrodes are attached to the patient.

### 10.6.3 Shock Paddles for Defibrillation and Cardioversion (Accessories)

To be able to perform therapy, the user has to apply the therapy electrodes (shock paddles) to the patient.

To place the shock paddles on the thorax of the patient, proceed as follows::

Prerequisite:

✓ Therapy electrodes/shock paddles are connected (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77)

✓ The patient is prepared (see 10.5 Preparing the Patient on page 82)

1. Completely wet the electrode surfaces of the shock paddles with defibrillation electrode gel.

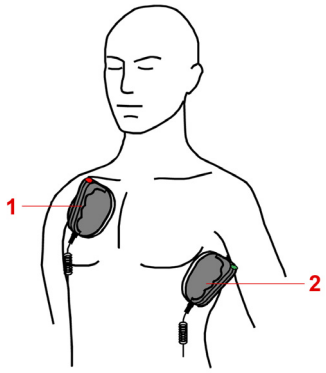



Fig. 10-10 Place the shock paddles on the thorax of the patient

1 STERNUM shock paddle
2 APEX shock paddle

2. Place the STERNUM shock paddle to the right of the sternum (item 1).
3. Place the APEX shock paddle on the lower left of the thorax beside apex of the heart (item 2).

   Shock paddles are placed on the thorax of the patient.

### 10.6.4 corPatch CPR disposable sensor (Accessories)

To be able to perform therapy, the user has to apply the corPatch CPR disposable sensor to the patient.

To attach the corPatch CPR disposable sensor to the patient, proceed as follows::

Prerequisite:

✓ corPatch CPR disposable sensor is attached

✓ The patient is prepared (see 10.5 Preparing the Patient on page 82)

1. Open the package of the corPatch CPR disposable sensor and take out the corPatch easy disposable sensor.
2. Remove the protective foil from the corPatch CPR disposable sensor on the side facing the patient.
3. Position the corPatch CPR disposable sensor on the upper body of the patient as shown in the picture.

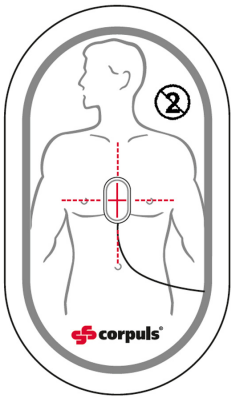



Fig. 10-11 Attaching the corPatch CPR disposable sensor to the patient

Apply the electrodes from the centre outwards so that no air pockets are included.

The corPatch CPR disposable sensor is connected to the patient.

### 10.6.5 primeCPR easy feedback sensor (Accessory)

**WARNING!**

Risk of injury due to unapproved accessories

Using unapproved accessories can lead to increased electromagnetic interference, decreased electromagnetic immunity and malfunctions. Falsified readings of the monitoring functions, delays or aborted therapy can cause serious injury.

► Make sure to use accessories provided or approved by the manufacturer.

To attach the primeCPR feedback sensor to the patient, proceed as follows::

Prerequisite:

✓ primeCPR feedback sensor is attached

✓ The patient is prepared (see 10.5 Preparing the Patient on page 82)

1. Remove the primeCPR feedback sensor from the packaging.
2. Remove the protective foil from the adhesive surface.
3. Attach the primeCPR feedback sensor to the patient's thorax. Make sure to position the sensor correctly.

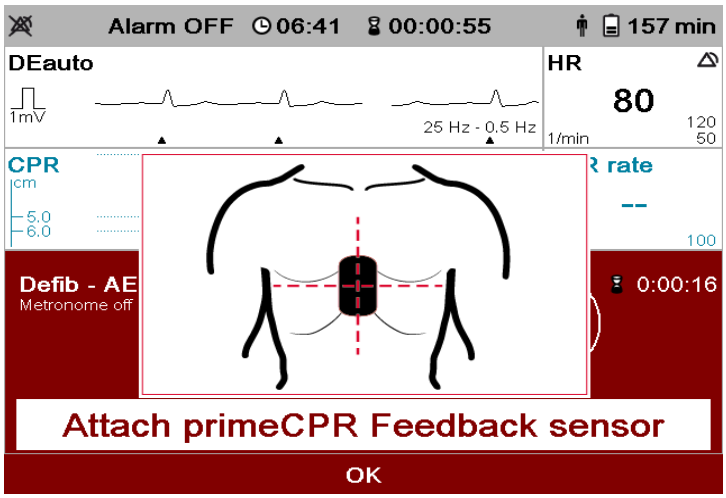



Fig. 10-12 Application note for the primeCPR feedback sensor

Apply the electrodes from the centre outwards so that no air pockets are included.

4. To close the application note, press softkey [OK].

For further information on using the primeCPR feedback sensors, read the corresponding user manuals.

## 10.7 Defibrillation and Cardioversion

For defibrillation and cardioversion of the patient, different modes are available:

- Automatic external defibrillation (AED mode)
- Manual defibrillation (manual mode)

In AED mode a therapy algorithm in the corpuls1 analyses the ECG data and triggers the charging of the defibrillator if necessary. The user can then deliver the defibrillation shock.

In manual mode the user evaluates the ECG data and delivers the defibrillation shock. For a cardioversion the user must synchronise the shock release by means of the synchronisation option Sync. The corpuls1 uses the ECG obtained via the therapy electrodes to identify the QRS complexes.

In AED mode and in manual mode, the corpuls1 signals and saves system alarms but no patient alarms (see 4.7 Alarm Design on page 31).

After the defibrillator is charged, the selected energy is available for 30 s. If the user does not deliver a shock within this period of time, the corpuls1 discharges the energy internally.

The use of a defibrillator in AED mode is not recommended for patients of less than twelve months of age.

If no special paediatric AED device is available for patients aged between 1 and 8 years, it is recommended to use the defibrillator in AED mode. The user can operate the corpuls1 in AED mode with corPatch easy electrodes (Pediatric/Pediatric Extended).

In AED mode and in manual mode the Auto II/DE curve is displayed in the uppermost curve field. The Auto II/DE curve alternates automatically between the DEauto lead and the IIauto lead, depending on whether the 4-pole ECG monitoring cable is connected or not. The lower curve and the vital parameters depend on the settings configured by the user OPERATOR.

The name DEauto indicates that the corpuls1 shows the ECG signal obtained via the corPatch easy electrodes, shock paddles or shock spoons. The name IIauto indicates that the corpuls1 shows the ECG signal obtained via the 4-pole ECG monitoring cable.

For a defibrillation the user has to call up the required defibrillation mode (see 10.7.3 Calling up AED mode on page 88) or (see 10.7.6 Calling up the Manual Mode on page 92).

If configured correspondingly by the operator, a defibrillation mode can be called up automatically at startup.

### 10.7.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

Operators can block the access to the manual defibrillation mode by means of a PIN code.

Before using the shock spoons, read and understand the additional user manual (P/N 04137)

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Impaired synchronisation due to artefacts!

In case of synchronous defibrillation (especially with shock paddles) without the 4-pole ECG monitoring cable, the positioning of the paddles can cause ECG artifacts that impair synchronisation.

► In this case, the user has to pay special attention to good contact and detection of regular QRS complexes.

**⚠ DANGER**

Insufficient monitoring during cardioversion!

May lead to the following side effects in the patient: Ventricular fibrillation or asystole.

► Make sure that the ECG is stable and the heart rate is at least 60 /min.

► For a cardioversion the user must synchronise the shock release by means of the synchronisation option SYNC.

► Make sure that QRS marks are present in each QRS complex. Do NOT rely on the QRS-/pulse tone alone.

► The shock release has to be effected according to valid guidelines.

Synchronisation setting *Auto sync.*: If the corpuls1 does not recognise QRS complexes within one second, the corpuls1 releases the shock asynchronously after holding down the key **Shock** (or after pressing the buttons at the shock paddles).

**⚠ WARNING!**

Electric shock when using the defibrillator!

Can lead to the following side effects in patients, users and third parties: arrhythmias, ventricular fibrillation or asystole.

► Place the patient on a dry or non-conductive surface before defibrillation and cardioversion.

► Before defibrillation and cardioversion, remove connections from the patient, e. g. bag valve mask and $O_2$ tubes.

► Do not touch patient during defibrillation and cardioversion.

► When using shock paddles, make sure that no electrode gel gets into the insulation area between the electrode surface and the handle.

**⚠ WARNING!**

Wrong selection of patient group!

If the shock is released with a level of energy not appropriate for the patient, this can lead to the following side effects in patients (arrhythmias, ventricular fibrillation or asystole).

► Select a patient group appropriate for the patient at the corpuls1.

The user is responsible for selecting an appropriate patient group at the device (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77) and (see 12.8.2 Submenu item Patient class/-group on page 128).

NOTICE

Effects of using the defibrillator on non-defibrillation-proof devices!

Can lead to malfunctions or failure of non-defibrillation-proof devices.

► Disconnect non-defibrillation-proof devices (e. g. separate ECG device) from the patient before defibrillation and cardioversion.

### 10.7.2 Patient impedance

In the following situations a high patient impedance can occur:

- Patient has excessive hair.
- Patient has soiled skin.
- Electrode surface of the shock paddles is wetted with too little electrode gel.
- Shock paddles are applied to the patient with too little pressure.
- The corPatch easy electrodes are not attached correctly to the patient.

In the following situations a low patient impedance can occur:

- Electrode surface of the shock paddles is wetted with too much electrode gel.
- The therapy electrodes have been attached to the patient with too little distance between them.
- The skin of the patient is wet.
- There are technical problems with the electrode cables.

The user can monitor the patient impedance in AED mode and in manual mode.

The following illustration shows the three possible impedance indications.


Fig. 10-13 Overview impedance indications

The current impedance indication is highlighted in white. If the impedance indication shows OK it is possible to release a shock. if the impedance shows Imp.↓ or Imp.↑ the shock release is blocked.

If shock paddles are used, there is an exception when charging the shock energy. With impedance Imp.↑ charging of the shock energy is possible, but no shock release.

To improve patient impedance, proceed as follows:

1. Remove excessive hair so that the conductive surface of the therapy electrodes has full contact with the skin.
2. Clean and dry the skin before using therapy electrodes.
3. Check the position of the therapy electrodes.
4. When using shock paddles: use either more or less electrode gel.
5. When using shock paddles: press down more.
   Patient impedance is acceptable. The user can perform defibrillation.

### 10.7.3 Calling up AED mode

To perform defibrillation in AED mode, the user has to call up the AED mode.

To call up the AED mode, proceed as follows:

Requirements:

✓ Therapy electrodes are connected to the device (see 10.4 Connecting Therapy Accessories on page 77)

1. Press **Defib** key.

   When the impedance indicator shows OK, the message ⟨Start analysis⟩ appears in the message line.

   The configuration can be set by the user OPERATOR in such a way that the **Analyse** key is additionally flashing red.

   The AED mode is called up.

The configuration can be set by the user OPERATOR in such a way that the device starts in monitoring mode and the manual mode can be called up by pressing the **Defib** key once. To call up the AED mode, the user has to press the **Defib** key twice.

### 10.7.4 Overview AED Mode

General function

In AED mode, the user is guided through a standardised resuscitation protocol. The AED mode supports the user by means of messages and audio instructions. The user can select the energy for the shock if the energy selection is not blocked by the user OPERATOR (see 13.2.3 Submenu item AED on page 141). The user OPERATOR can also select the initial energy (see 13.2.3 Submenu item AED on page 141). If the user is expected to press the **Analyse** key or the **Shock** key(see 4.4 Display and Operating Elements on page 28) these respective keys are flashing red. If these keys are flashing red or not, depends on the settings configured by the user OPERATOR.

If the corpuls1 detects a shockable rhythm, the defibrillator starts charging. If the corpuls1 detects a non-shockable rhythm during further analysis, the corpuls1 aborts charging and discharges internally. The user has to re-start analysis. If the corpuls1 continually detects a shockable rhythm, the selected energy level is available for 30 s after charging. If the user releases no shock within this time span, the device discharges itself internally. Additionally, the ready signal is sounding.

PreShock CPR function

The preShock CPR phase follows the analysis phase. During preShock CPR phase the corpuls1 continues the AED algorithm with the possibility to perform a specified amount of compressions before the shock is delivered. When the preShock CPR function is activated, the device remains ready for shock for 30 s after a shockable rhythm is detected. During the preShock CPR phase, the metronome indicates additional compressions. The number of additional compressions is configurable at user level OPERATOR. After the defibrillator is charged at the beginning of the preShock CPR phase, the user can release the shock at any time. During this phase, the volume of the ready signal is reduced. After preShock CPR, the corpuls1 increases the volume again and the key **Shock** is flashing. After the shock is released, the metronome continues the compression tone according to the standard AED algorithm.

Audio recording

In AED mode, a configurable audio recording option is available which is disabled by default. If the user OPERATOR activates audio recording, the corpuls1 records all surrounding noise, beginning 10 s before the start of the analysis until 10 s after the shock (see 13.2.2 Submenu item Settings on page 140). The volume of the audio recording is fixed. The corpuls1 stores the audio recording in the mission data.

The following illustration gives an overview of the AED mode:

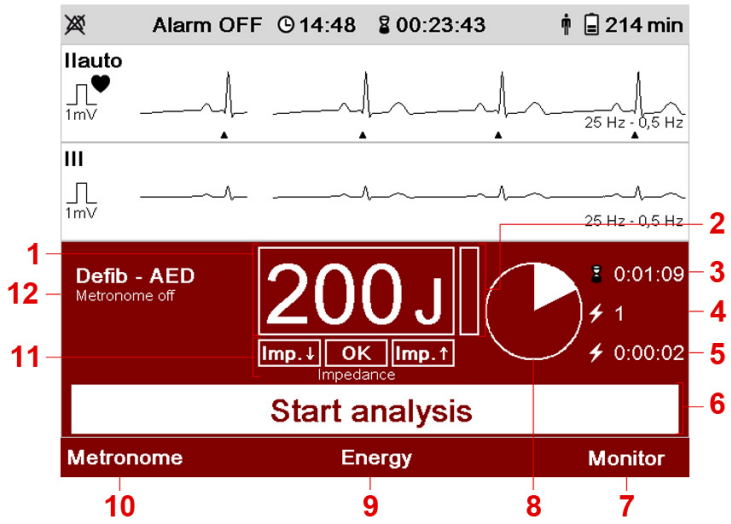



Fig. 10-14 Overview AED Mode

| Item | Element | Description |
|---|---|---|
| 1 | Energy | Indicates the set energy for the shock. |
| 2 | Charging status of the defibrillator | Indicates the charging status of the defibrillator.<br>If the charging status bar is completely white, the energy for the shock is available. |
| 3 | Running time defibrillation mode | Indicates the running time in defibrillation mode in hours, minutes and seconds in the format *hh:mm:ss*.<br>If the user switches between manual mode and AED mode, the running time continues. |
| 4 | Delivered shocks | Indicates the number of delivered shocks.<br>If the user switches between manual mode and AED mode, the running time continues. |
| 5 | Last shock | Indicates, how much time has passed since the last shock in hours, minutes and seconds in the format *hh:mm:ss*.<br>If the user switches between manual mode and AED mode, the running time continues. |
| 6 | Message line | Shows messages to the user. |
| 7 | Softkey [Monitor] | Allows to close the defibrillation mode and to return to monitoring mode. |
| 8 | CPR countdown | Clock symbol with countdown: Starts at the end of the analysis phase and shows the prompt ⟨Perform CPR⟩ and the CPR countdown. |
| 9 | Softkey [Energy] | Allows to select the energy for the shock. |
| 10 | Softkey [Metronome] | Allows to select the metronome mode (see 10.9.2 Starting or Stopping the Metronome on page 104). |
| 11 | Impedance | Indicates the impedance of the patient. The current impedance is highlighted in white. |
| 12 | Metronom mode | Indicates the currently selected metronome mode. |

Tab. 10-2 Overview AED Mode

### 10.7.5 Performing defibrillation in AED mode with corPatch easy electrodes

The preShock CPR function is available in AED mode of the corpuls1. The duration of the phase before shock release can be configured at user level OPERATOR. If the user has not released a shock 30 s after charging the defibrillator, the device discharges internally.

When the following prerequisites are met, the user can start therapy.

To perform defibrillation in AED mode with corPatch easy electrodes, proceed as follows:

Requirements:

- ✓ The therapy electrodes have been attached to the patient (see 10.6.1 Connecting corPatch easy Electrodes for Defibrillation and Cardioversion to the Patient on page 82)
- ✓ AED mode is called up (see 10.7.4 Overview AED Mode on page 89)
- ✓ Impedance indicator is OK (see 10.7.2 Patient impedance on page 88)

1. To start the ECG analysis, press the **Analyse** key.

If the energy selection has been enabled at user level OPERATOR, the softkey [Energy] is visible.

To configure the energy level, press softkey [Energy] repeatedly until the required energy level is marked in yellow and confirm with softkey [OK].

If the corpuls1 detects a shockable rhythm, the defibrillator starts charging. If the corpuls1 detects a non-shockable rhythm during further analysis, the defibrillator aborts charging and discharges internally. The user has to re-start analysis.

The ECG analysis starts.

2. One of the following situations occurs:
   a) The message ⟨Deliver shock⟩ appears and the ready signal sounds.
      The configuration can be set by the user OPERATOR in such a way that the **Shock** key is additionally flashing red.
      To deliver a shock, hold down the **Shock** key until the shock has been delivered.
      The message ⟨Shock performed⟩ appears.
   b) The message ⟨Shock not recommended⟩ appears.
      It is not possible to release a shock.

   The message ⟨Perform CPR⟩ appears.

   The corpuls1 shows the running CPR countdown.
3. Continue to perform the standardised or locally valid resuscitation protocol until the configured compressions are done.
4. The message ⟨Start analysis⟩ appears.

   Repeat the instruction from step 1.

   Defibrillation has been performed.

preShock CPR phase

To perform defibrillation in AED mode with corPatch easy electrodes and enabled preShock CPR function, proceed as follows:

Requirements:

- ✓ The preShock CPR function is enabled.
- ✓ The ECG analysis has yielded "Shock recommended".

1. Perform CPR and follow the cues of the corpuls1.
   Ready-signal decreases volume.
   The message ⟨Perform preShock CPR⟩ appears.
   The **Shock** key is not flashing.
2. Perform the additional preShock CPR compressions.
   The preShock CPR function indicates the compressions to be performed.

When the user releases a shock during preShock CPR, the AED algorithm starts anew.

   If the configured preShock CPR compressions have been signalled, the message ⟨Deliver shock⟩ appears in the message line and the **Shock** key flashes red.
3. To deliver a shock, hold down the **Shock** key until the shock has been delivered.
   The message ⟨Shock performed⟩ appears.
4. Continue to perform the standardised or locally valid resuscitation protocol.
5. The message ⟨Start analysis⟩ appears.
   Repeat the instruction from step1 without preShock.
   Defibrillation has been performed.

### 10.7.6 Calling up the Manual Mode

To perform defibrillation or cardioversion in manual mode, the user has to call up the manual mode.

To call up the manual mode, proceed as follows:

Requirements:

✓ Therapy electrodes are connected to the device (see 10.4 Connecting Therapy Accessories on page 77)

1. Press twice the **Defib** key.

If the access control for the manual mode is enabled, the user has to enter the access code for manual mode *MAN. DEFIB.*.

   The message ⟨Manual defibrillation mode?⟩ appears.
2. Press softkey [OK].
   When the impedance indicator shows OK, the message ⟨Ready for charging⟩ appears in the message line.

To abort the process, press softkey [Cancel].

   The manual mode is called up.

The configuration can be set by the user OPERATOR in such a way that the device starts in monitoring mode and the manual mode can be called up by pressing the **Defib** key once.

In this case, the message ⟨Manual defibrillation mode?⟩ does not appear.

The configuration can be set by the user OPERATOR in such a way that the device already starts in AED mode. To call up the manual mode, press the **Defib** key once and confirm the message ⟨Manual defibrillation mode?⟩ by pressing the softkey [OK].

### 10.7.7 Overview Manual Mode

The manual mode allows the users full freedom of action and decision-making concerning the operation of the defibrillator. The users have to assess the ECG on their own authority and can select the energy for the defibrillation shock on their own responsibility. When the user has charged the shock energy, the device is ready to shock.

The configuration can be set by the user OPERATOR in such a way that the corpuls1 indicates readiness to shock additionally with the ready signal and/or the **Shock** key flashing red (see 4.4 Display and Operating Elements on page 28).

The following illustration gives an overview of the manual mode:

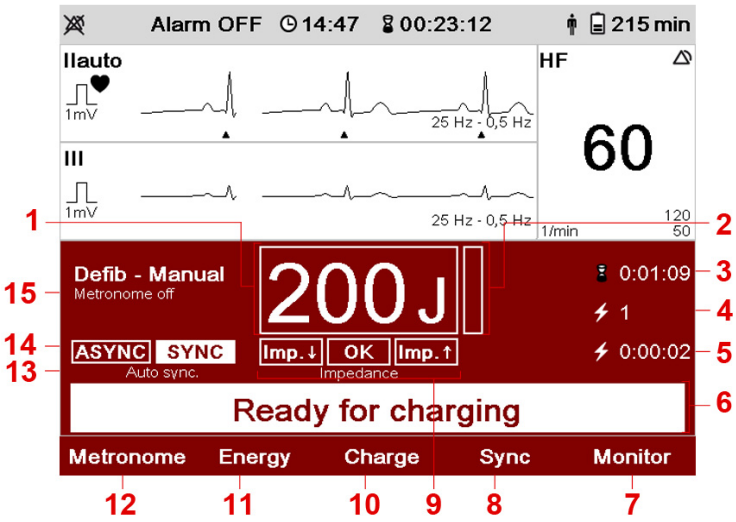



Fig. 10-15 Overview Manual Mode

| Item | Element | Description |
|---|---|---|
| 1 | Energy | Indicates the set energy for the shock. |
| 2 | Charging status of the defibrillator | Indicates the charging status of the defibrillator.<br>If the charging status bar is completely white, the energy for the shock is available. |
| 3 | Running time defibrillation mode | Indicates the running time in defibrillation mode in hours, minutes and seconds in the format *hh:mm:ss*.<br>If the user switches between manual mode and AED mode, the running time continues. |
| 4 | Delivered shocks | Indicates the number of delivered shocks.<br>If the user switches between manual mode and AED mode, the running time continues. |
| 5 | Last shock | Indicates, how much time has passed since the last shock in hours, minutes and seconds in the format *hh:mm:ss*.<br>If the user switches between manual mode and AED mode, the running time continues. |

Tab. 10-3 Overview Manual Mode

| Item | Element | Description |
|---|---|---|
| 6 | Message line | Shows messages to the user. |
| 7 | Softkey [Monitor] | Allows to close the defibrillation mode and to return to monitoring mode. |
| 8 | Softkey [Sync] | Allows to select the synchronisation options *Auto Sync.*, *Sync.* and *Async.*. |
| 9 | Impedance | Indicates the impedance of the patient. The current impedance is highlighted in white. |
| 10 | Softkey [Charge] | Allows to charge the defibrillator. |
| 11 | Softkey [Energy] | Allows to select the energy for the shock. |
| 12 | Softkey [Metronome] | Allows to select the metronome mode (see 10.9.2 Starting or Stopping the Metronome on page 104). |
| 13 | *Auto Sync.* Synchronisation status | Indicates the currently selected synchronisation option *Auto Sync.*. |
| 14 | Synchronisation option | Indicates the currently selected synchronisation option (*SYNC/ASYNC*). |
| 15 | Metronom mode | Indicates the currently selected metronome mode. |

Tab. 10-4 Overview Manual Mode

The following synchronisation options are available:

- *Auto Sync.*

  If QRS complexes are detected, the corpuls1 synchronises the shock release automatically for a cardioversion. If the corpuls1 does not detect QRS complexes within one second, the shock is released asynchronously.
- *Sync.*

  If QRS complexes are detected, the corpuls1 synchronises the shock release for a cardioversion. If no QRS complexes are detected, a shock release is not possible.
- *Async.*

  The corpuls1 performs only asynchronous defibrillation. A cardioversion is not possible.

If the field *SYNC* is highlighted white and there are QRS complexes detected, the corpuls1 synchronises the shock release for a cardioversion. If the field *ASYNC* is highlighted white, the corpuls1 performs asynchronous defibrillation.

### 10.7.8 Performing Defibrillation and Cardioversion in Manual Mode with corPatch easy Electrodes

When the following prerequisites are met, the user can start therapy.

To perform defibrillation and cardioversion in manual mode with corPatch easy electrodes, proceed as follows:

Prerequisite:

✓ The therapy electrodes have been attached to the patient (see 10.6.1 Connecting corPatch easy Electrodes for Defibrillation and Cardioversion to the Patient on page 82)

✓ Manual mode is called up (see 10.7.6 Calling up the Manual Mode on page 92)

✓ Impedance indicator is OK (see 10.7.2 Patient impedance on page 88)

1. To configure the energy level, the following options are available:
   a) Press softkey [Energy]. Press softkey [Energy] repeatedly until the required energy level is marked in yellow. Confirm the energy level by pressing the softkey [OK].
   b) Press softkey [Energy]. To configure the energy level, press softkey [Up] or [Down]. Confirm the energy level by pressing the softkey [OK].

   The energy level has been set.
2. To configure synchronisation settings, press softkey [Sync].

After calling up the manual mode, the synchronisation setting *Sync = Auto Sync.* is automatically enabled.

When the synchronisation setting *Sync* is selected, the synchronisation setting *Auto Sync.* is enabled.

When selecting the synchronisation setting *Sync = Sync.* the synchronisation type *SYNC* appears.

When selecting the synchronisation setting *Sync = Async.* the synchronisation type *ASYNC* appears.

If the user wants to initiate cardioversion on QRS complexes that are always present, the synchronization setting is *Sync = Sync.* to choose.

3. To start the charging process of the defibrillator, press softkey [Charge].

   The message ⟨Charging⟩ appears in the message line.

   The message ⟨Deliver shock⟩ appears.

   The configuration can be set by the user OPERATOR in such a way that the corpuls1 indicates readiness to shock additionally with the ready signal and/or the **Shock** key flashing red.

To abort the process, press softkey [Cancel].

4. To deliver a shock, hold down the **Shock** key until the shock has been delivered.

   The message ⟨Shock performed⟩ appears.
5. Continue to perform the standardised or locally valid resuscitation protocol.
6. If necessary, release more asynchronous or synchronous shocks (steps 3 to 5)

   Defibrillation or cardioversion has been performed.

### 10.7.9 Performing Defibrillation and Cardioversion in Manual Mode with Shock Paddles

When the following prerequisites are met, the user can start therapy.

To improve the signal quality, the user can attach the ECG electrodes of the 4-pole ECG monitoring cable to the patient (see 9.3.1 ECG electrodes (accessories) on page 67). The corpuls1 obtains then the ECG via the ECG electrodes (see 9.6 ECG monitoring on page 70).

To perform defibrillation and cardioversion in manual mode with shock paddles, proceed as follows:

Prerequisite:

✓ Manual mode is called up (see 10.7.6 Calling up the Manual Mode on page 92)

1. To configure the energy level, the following options are available:
   a) Hold both shock paddles with the electrode surfaces against each other (short circuit). To decrease the energy, briefly press the green **APEX** shock paddle button. To increase the energy, briefly press the red **STERNUM** shock paddle button.
   b) Press softkey [Energy]. Press softkey [Energy] repeatedly until the required energy level is marked in yellow. Confirm the energy level by pressing the softkey [OK].
   c) Press softkey [Energy]. To configure the energy level, press softkey [Up] or [Down]. Confirm the energy level by pressing the softkey [OK].

   The energy level has been set.
2. To configure synchronisation settings, press softkey [Sync] and proceed as described in manual mode with corPatch easy electrodes (see 10.7.8 Performing Defibrillation and Cardioversion in Manual Mode with corPatch easy Electrodes on page 94).
3. To start the charging process of the defibrillator, the following options are available:
   a) Press the green **APEX** shock paddle button.
   b) Press the red **STERNUM** shock paddle button.

   The message ⟨Charging⟩ appears in the message line.

   The message ⟨Deliver shock⟩ appears.

   The configuration can be set by the user OPERATOR in such a way that the corpuls1 indicates readiness to shock additionally with the ready signal and/or the **Shock** key flashing red.

To abort the process, press softkey [Cancel]. The charged defibrillator can also be discharged internally, with the user pressing both button at the shock paddles **APEX** and **STERNUM** simultaneously.

If the user aborts the procedure with the buttons at the shock paddles, the message ⟨Shock aborted⟩ appears.

If the user could not start charging, no softkey [Cancel] appear.

If one of the buttons at the shock paddles **APEX**/**STERNUM** has an undefined status, the message ⟨Press shock paddle buttons again⟩ appears in the message line.

4. Position the shock paddles onto the thorax of the patient (see 10.6.3 Shock Paddles for Defibrillation and Cardioversion (Accessories) on page 84).
5. To deliver a shock, hold down both the green **APEX** and the red **STERNUM** shock paddle buttons simultaneously until the shock has been delivered.

   The message ⟨Shock performed⟩ appears.
6. Continue to perform the standardised or locally valid resuscitation protocol.

### 10.7.10 Performing Defibrillation and Cardioversion in Manual Mode with Baby Shock Electrodes

In order to use the baby shock electrodes (adapters), the user has to connect the baby shock electrodes with the shock paddles.

If baby shock electrodes are used and the patient group Neonate is selected, the device automatically reduces the energy to 10 % of the selected value, i. e. up to max. 20 J.

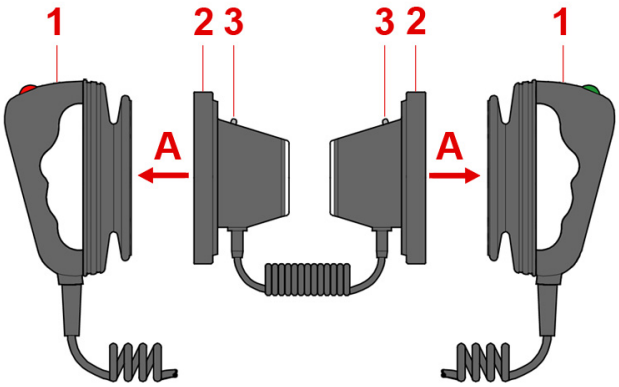



Fig. 10-16 Preparing shock paddles with baby shock electrodes

1 Shock paddles (for adults)
2 Baby shock electrodes
3 Diode

To prepare the shock paddles for use with baby shock electrodes (adapters) (including functional test), proceed as follows:

Prerequisite:

✓ Shock paddles are connected (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77)

1. Press (item A) the baby shock electrodes (item 2) onto the shock paddles (item 1).
   The curved edge engages perceptibly.
2. Select an energy level of e.g.. 100 J so that an energy level 10 J can be released via the baby shock electrodes. To select the energy level, the following options are available:
   a) Press softkey [Energy] repeatedly until the required energy level is marked in yellow. Confirm with the softkey [OK].
   b) Press softkey [Energy]. To select the energy level, press softkey [Up] or [Down]. Confirm with the softkey [OK].
   The energy level has been set.
3. Functional test:
   Hold baby shock electrodes together with the electrode surfaces touching (short circuit), then start the charging process by pressing the green shock paddle button **APEX** or the red button **STERNUM**. After charging, press both shock paddle buttons **APEX** and **STERNUM** simultaneously to release the shock.
4. One of the following situations occurs:
   a) Both diodes (item 3) light up.
      The shock counter registers a released shock.
      The shock paddles with baby shock electrodes are ready to use.
   b) Both diodes (item 3) do not light up.
      Check the connections and repeat the instruction from step 3.

The user can perform defibrillation and cardioversion on children and neonates in manual mode. Perform defibrillation as described for shock paddles in manual mode (see 10.7.9 Performing Defibrillation and Cardioversion in Manual Mode with Shock Paddles on page 95).

### 10.7.11 Performing Defibrillation and Cardioversion in Manual Mode with Shock Spoons

**CAUTION**

Wrong handling due to failure to read the user manual!

Can lead to endangerment of users, patients and third parties.

► Read and follow the shock spoon user manual (P/N: 04137).

The shock spoons for internal defibrillation consist of the shock spoon electrodes, the shock spoon handles and the pertaining Y-adapter cable. Before use the shock spoon electrodes have to be screwed onto the handles. The shock spoon holders have to be connected with the pertaining Y-adapter. The user has to connect the plug at the shock spoon adapter cable to the therapy socket of the corpuls1.

If the user connects the shock spoons to the corpuls1, the energy is limited automatically to 50 J.

The manufacturer recommends to obtain the ECG via the ECG monitoring cable (see 9.6 ECG monitoring on page 70).

When the following prerequisites are met, the user can start therapy.

To perform defibrillation and cardioversion in manual mode with shock spoons, proceed as follows:

Prerequisite:

✓ Shock spoons are connected (see 10.4.2 Shock Spoons (Accessories) on page 79)

✓ A second user handles the shock spoons

✓ Manual mode is called up (see 10.7.6 Calling up the Manual Mode on page 92)

1. To configure the energy level, the following options are available:
   a) Press softkey [Energy]. To configure the energy level, press softkey [Up] or [Down]. Confirm the energy level by pressing the softkey [OK].
   b) Press softkey [Energy]. Press softkey [Energy] repeatedly until the required energy level is marked in yellow. Confirm the energy level by pressing the softkey [OK].
   The energy level has been set.
   The message ⟨Ready for charging⟩ appears.

To abort the process, press softkey [Cancel].

2. To configure synchronisation settings, press softkey [Sync] and proceed as described in manual mode with corPatch easy electrodes (see 10.7.8 Performing Defibrillation and Cardioversion in Manual Mode with corPatch easy Electrodes on page 94).
3. To start the charging process of the defibrillator, press softkey [Charge].
   The message ⟨Deliver shock⟩ appears.
   The configuration can be set by the user OPERATOR in such a way that the corpuls1 indicates readiness to shock additionally with the ready signal and/or the **Shock** key flashing red.
4. Press the shock spoons to the heart of the patient.
   The shock spoons are pressed to the heart of the patient.
5. To deliver a shock, hold down the **Shock** key until the shock has been delivered.
   The message ⟨Shock performed⟩ appears.

To abort the process, press softkey [Cancel].

6. Continue to perform the standardised or locally valid resuscitation protocol.
   Defibrillation or cardioversion has been performed.

## 10.8 Pacer (Option)

The external pacer of the corpuls1 allows electrical stimulation of the heart muscle. The electrical stimulation can supplement or positively influence the function of the heart muscle.

The pacer emits pacing pulses via the corPatch easy electrodes.

In FIX operating mode, the pacer stimulates the heart muscle with the set stimulation frequency regardless of the patient's own heart rate.

In DEMAND mode the corpuls1 analyses the ECG via the 4-pole ECG monitoring cable. In DEMAND mode, the pacer only stimulates when the patient's heart rate, obtained via the 4-pole ECG monitoring cable, differs from the pre-set pacing frequency. The automatic recognition of QRS complexes prevents pacing during the vulnerable phase of the heart.

To detect the patient's own heart rate in DEMAND mode, the 4-pole ECG monitoring cable is necessary.

When the user has set the parameters *Frequency* and *Intensity*, the corpuls1 emits pacing impulses in the pacer modes (DEMAND/FIX).

The patient must not remain unattended when using the external pacer.

Regularly check effectiveness of the pacer by checking the central pulse.

In pacer mode, the topmost curve is the IIauto lead. In pacer mode, the lower curve and the vital parameters depend on the settings configured by the user OPERATOR.

### 10.8.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Wrong configuration of pacer mode!

If the DEMAND mode is indicated and the FIX mode is used instead, this may cause the release of pacer pulses in the vulnerable phase. This can lead to arrhythmias, ventricular fibrillation or asystole.

► Make sure to use the FIX mode only when indicated.

**⚠ WARNING!**

Patients with implanted pacers!

In patients with an implanted pacer, it is possible that shockable ECG rhythms or arrhythmias will only be detected to a limited extent.

► The user has to assess the ECG rhythms or arrhythmias correctly, based on experience.

**⚠ CAUTION**

Attaching or removing ECG electrodes during ECG monitoring in DEMAND mode!

If this occurs, the corpuls1 briefly displays false-positive pacer pulses, although the patient does not have an implanted pacer.

► Attach the ECG electrodes before calling up the pacer in DEMAND mode.

### 10.8.2 Calling up the Pacer Mode

To be able to perform pacer therapy the user has to call up the pacer mode.

To call up the pacer mode, proceed as follows:

Prerequisite:

- ✓ The corpuls1 is switched on
- ✓ The therapy electrodes have been attached to the patient (see 10.6.2 Attaching corPatch easy Electrodes to the Patient on page 83)
- ✓ To use the pacer mode DEMAND, the 4-pole ECG monitoring cable must be connected to the corpuls1

1. Press the **Pacer** key.

   The pacer mode DEMAND is called up, but not yet active (see 8.1 Structure of the user interface on page 63).

   The message ⟨Select intensity/frequency⟩ appears.

   After calling up the pacer mode, the monitoring mode stays active in the background. If one of the defibrillation modes was active, the corpuls1 automatically closes this mode when the pacer mode is called up.

Performing pacer therapy is only possible, if corPatch easy electrodes are connected to the corpuls1.

If the user removes the corPatch easy electrode cable during pacer therapy, the pacer stops automatically. The corpuls1 pacer no longer emits pacer pulses and the message ⟨Connect pacer cable⟩ appears. If the user re-connects the corPatch easy electrode cable, the pacer resumes emitting pacer pulses.

Performing pacer therapy in DEMAND mode is only possible, if the 4-pole ECG monitoring cable is connected.

If the user removes the 4-pole ECG monitoring cable during pacer therapy, the pacer stops automatically and the message ⟨Switch pacer to FIX mode?⟩ and a confirmation prompt appears. If the user re-connects the 4-pole ECG monitoring cable within 10 s, the pacer resumes stimulation.

The user can switch between pacer mode and monitoring mode, without having to interrupt pacer therapy.

If the user switches from monitoring mode to defibrillation mode while the pacer is active, the message ⟨Switch off pacer?⟩ appears. The user has to confirm with the softkey [OK] to switch to defibrillation mode.

### 10.8.3 Overview Pacer mode

The message ⟨STIM⟩ in curve field1 bottom left indicates the following status:

| Status of the ⟨STIM⟩ message | Description |
|---|---|
| STIM permanent | Pacer mode is called up, but not stimulating, e. g. in DEMAND mode when stimulation is not necessary. |
| STIM flashing | The pacer is stimulating. |
| STIM not displayed | The pacer is switched off or pauses. |

Tab. 10-5 Status of the ⟨STIM⟩ message

The following illustration gives an overview of the pacer mode.

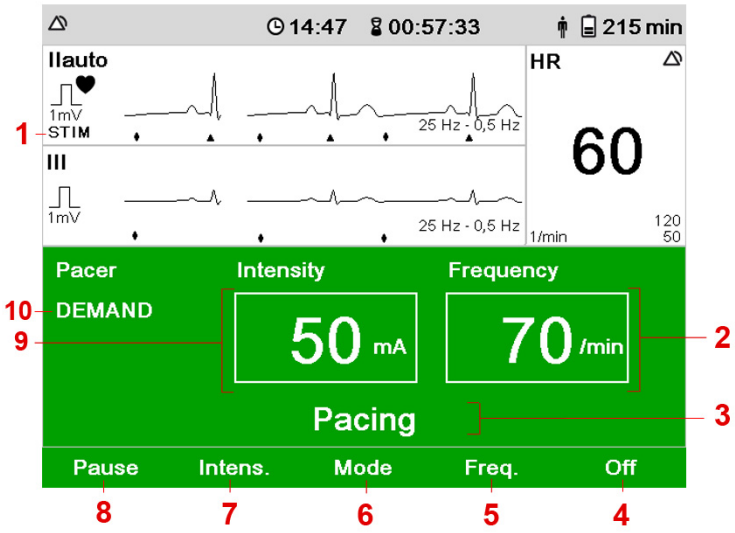



Fig. 10-17 Overview Pacer mode

| Item | Element | Description |
|---|---|---|
| 1 | STIM | Indicates a pacer pulse. Is displayed permanently or flashes according to the frequency of stimulation. |
| 2 | Rate | Indicates the configured pacing frequency. |
| 3 | Message line | Shows messages to the user. |
| 4 | Softkey [Off] | Allows to end pacing. |
| 5 | Softkey [Freq.] | Allows to set the stimulation frequency. |
| 6 | [Mode] softkey | Allows to switch the pacer mode. |
| 7 | Softkey [Intens.] | Allows to set the intensity of the pacer pulse. |
| 8 | Softkey [Pause] | Allows to pause pacing. |
| 9 | Intensity | Indicates the configured intensity of the pacer pulse in mA. |
| 19 | Pacer mode (DEMAND/FIX) | Indicates the currently selected pacer mode (DEMAND/FIX). |

Tab. 10-6 Overview Pacer mode

### 10.8.4 Performing Pacer Therapy

DEMAND mode

The pacer always starts in DEMAND operating mode, with the intensity at 0 mA and pacing frequency at 70 /min.

Pacing begins automatically as soon as an intensity of more than 0 mA is selected and the stimulation frequency is higher than the heart rate.

The corpuls1 immediately adjusts the pacing frequency and -intensity, when the user changes those parameters.

When the following prerequisites are met, the user can start therapy.

To perform pacer therapy with corPatch easy electrodes, proceed as follows:

Requirements:

- ✓ Pacer mode DEMAND is called up
- ✓ The therapy electrodes have been attached to the patient (see 10.6.2 Attaching corPatch easy Electrodes to the Patient on page 83)
- ✓ To use the pacer mode DEMAND, the 4-pole ECG monitoring cable must be connected to the corpuls1

1. DEMAND mode: Check if the ECG signal is stable.
   The message ⟨Select intensity/frequency⟩ appears.

If the operating mode FIX is indicated, press softkey [Mode].
The message ⟨Select mode⟩ appears.
Press softkey [FIX].
The pacer switches from DEMAND mode to FIX mode.

2. To select the pacing frequency, press softkey [Freq.].
   The field ***Frequency*** is highlighted in white.
   The message [Select frequency] appears.
3. To configure the pacing frequency, press softkey [Up] or [Down].
4. Confirm with the softkey [OK].
   The pacing frequency has been selected.

To abort the process, press softkey [Cancel].

5. To select the pacing intensity, press softkey [Intens.].
   The field ***Intensity*** is highlighted in white.
   The message ⟨Select intensity⟩ appears.
6. To configure the intensity, press softkey [Up] or [Down].
7. Confirm with the softkey [OK].
   The pacing intensity has been selected.
   The message ⟨Pacing⟩ appears.
   The pacer is stimulating. The message ⟨STIM⟩ is displayed in curve field1 bottom left, flashing or permanent.

To abort the process, press softkey [Cancel].

**No ECG signal in DEMAND mode**

If there is no ECG signal in DEMAND mode, the confirmation request ⟨Switch pacer to FIX mode?⟩ appears in the message line. This confirmation request offers the option to switch to FIX mode or to terminate pacer therapy. This is the case if, e. g. the ECG monitoring cable is removed. Simultaneously the alarm message ✦No ECG cable (DEMAND)✦ appears in the status line. If the user chooses no option, the confirmation prompt closes automatically after 10 s and the pacer stops and the message ⟨No ECG cable (DEMAND)⟩ appears in the message line.

The confirmation request also appears, if the corpuls1 is in monitoring mode with the pacer running. If the user does not respond, the confirmation request closes automatically after 10 s and the corpuls1 switches the pacer off. The message ⟨No ECG cable (DEMAND)⟩ is displayed in the message line.

To continue pacing, proceed as follows:

1. To switch to FIX mode press softkey [Yes].
   The corpuls1 continues pacing in FIX mode.
2. To stop pacing press softkey [No].
   Pacer is off.
   The message ⟨No ECG cable (DEMAND)⟩ appears.

Switching to Monitoring Mode

The user can switch to monitoring mode while pacer therapy is carried out in the background.

To switch to monitoring mode, proceed as follows:

1. Press the **Pacer** key.
   The user interface switches from pacer mode to monitoring mode.

### 10.8.5 Pausing the Pacer Mode

If the corpuls1 operates in pacer mode, the user can pause the pacer.

To pause the pacer, proceed as follows:

Prerequisite:

✓ One of the pacer modes FIX or DEMAND is active

1. Press softkey [Pause].
   The confirmation prompt ⟨Pause pacing?⟩ appears.
2. Confirm with the softkey [Yes].
   The message ⟨Pause⟩ appears.

If the user does not want to pause the pacer and presses the softkey [No], the message ⟨Pacing⟩ appears. The corpuls1 continues pacer therapy.

3. To continue pacer therapy after the message ⟨Pause⟩, press softkey [Cont. pacing].
   The message ⟨Continue pacing?⟩ appears.
4. Confirm with the softkey [Yes].
   The message ⟨Pacing⟩ appears.
   The pacer is stimulating. The message ⟨STIM⟩ is displayed in curve field1 bottom left, flashing or permanent.

If the user presses the softkey [No], the message *Pause* appears.

### 10.8.6 Exiting the Pacer Mode

If the corpuls1 is in pacer mode, the user can exit the pacer mode.

To exit the pacer mode, proceed as follows:

Prerequisite:

✓ One of the pacer modes FIX or DEMAND is active

1. To stop pacing, press the softkey [Off].
   The message ⟨Switch off pacer?⟩ appears.
2. Confirm with the softkey [Yes].

If the user presses the [No] softkey, the corpuls1 continues stimulation.

The pacer is switched off.

## 10.9 Metronome

The metronome of the corpuls1 supports the user acoustically during cardio-pulmonary resuscitation by means of compression- and ventilation tones. The metronome is available in AED mode and in manual mode.

The compression tone signals to the user in what rhythm to
perform thorax compressions. To signal the upcoming ventilation phase, the five last compression tones are higher pitched. The ventilation tones indicate when the user needs to ventilate the patient. The metronome issues tones for inspiration and tones for expiration. The metronome switches automatically between compression tones and ventilation tones.

If the user activates the metronome while the QRS tone is active, the QRS tone is muted automatically.

The metronome stays switched on in the following situations:

- If the user switches between manual mode and AED mode while the metronome is active.
- If the user switches to monitoring mode.

The metronome pauses automatically and later continues in the following situations:

- When the device is ready to shock in manual mode.
- After the shock has been released or 10 seconds after readiness to shock without releasing a shock, the metronome resumes signalling the compression tone.
- During the ECG analysis in AED mode.

### 10.9.1 Overview Metronome Settings

The following table shows the available metronome modes:

| Setting | Description |
|---|---|
| Child continuous | The metronome issues continuously compression tones. |
| Child 15:2 | 15 compression tones followed by 2 ventilation tones. |
| Child 30:2 | 30 compression tones followed by 2 ventilation tones. |
| Adult continuous | The metronome issues continuously compression tones. |
| Adult 30:2 | 30 compression tones followed by 2 ventilation tones. |
| off | The metronome is switched off. |

Tab. 10-7 Overview Metronome Settings

### 10.9.2 Starting or Stopping the Metronome

The metronome starts automatically in AED or manual mode, if so configured at user level OPERATOR.

If the following prerequisites are met, the user can start the metronome.

To start or stop the metronome, proceed as follows:

Prerequisite:

✓ AED mode (see 10.7.4 Overview AED Mode on page 89) or manual mode (see 10.7.7 Overview Manual Mode on page 93) is called up

1. To start the metronome and select a metronome mode, press softkey [Metronome] several times until the required metronome mode is marked in yellow.

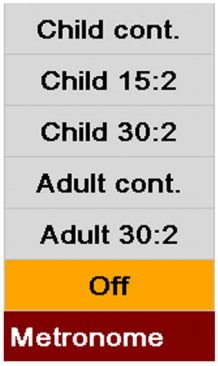



Fig. 10-18 Softkey Context Menu Metronome

The softkey context menu closes.

The selected metronome mode is displayed.

The metronome starts in the selected mode.

2. To switch off the metronome, press softkey [Metronome] several times until *Off* is highlighted.

The softkey context menu closes.

The selected metronome mode *Off* is displayed.

The metronome is switched off.

## 10.10 Working with CPR Feedback (Option)

The CPR Feedback function (option) assists the user with cardiopulmonary resuscitation providing important information on the quality of the thorax compressions. The function provides information on the compression rate and -depth of the thorax compressions during resuscitation.

The function CPR Feedback is available in the following application areas:

- AED mode
- Manual defibrillation mode
- Monitoring mode

Currently the following CPR Feedback sensors are available:

| | |
|---|---|
| corPatch CPR feedback sensor (disposable) | Blue plug and socket<br>P/N 04235.2<br>Available up to 2022-06-11 |
| primeCPR easy feedback sensor (disposable) | Green plug and socket<br>P/N 04235.5<br>Available as of January 2024 |
| primeCPR feedback sensor (reusable) | Green plug and socket<br>P/N 04235.4<br>Available as of January 2024 |

Tab. 10-8 Selection CPR Feedback sensors

Older devices can be retrofitted. For further information please contact your authorised sales and service partners.

### 10.10.1 Using corPatch CPR Disposable Sensor (Accessory)

The corPatch CPR function assists the user with cardiopulmonary resuscitation providing important information on the quality of the thorax compressions.

The corPatch CPR disposable sensor used with the corpuls1 measures the rate and depth of a thorax compression. The user can react directly to the feedback of the corPatch CPR sensor and take appropriate action.

Among the information are the display of the current CPR rate as well as the compression depth curve of the current thorax compressions.

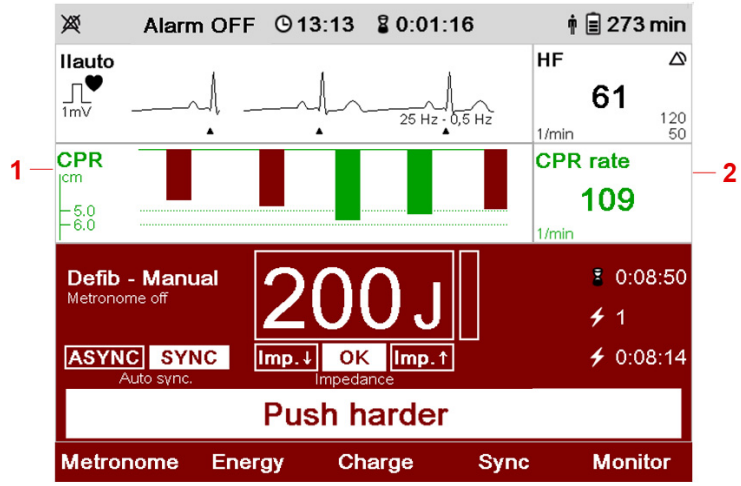



Fig. 10-19 corPatch CPR feedback information

1 Curve CPR compression depth

2 Vital parameter CPR rate

The CPR rate is displayed as vital parameter and the CPR curve as curve, depending on the settings configured by the user (see 12.4.1 Submenu item Curves on page 118)/(see 12.4.2 Submenu item Parameters on page 119) and the user OPERATOR (see Tab. 13-14 Settings manual mode (user OPERATOR) - List View on page 144). The CPR curve is synchronous to the ECG curve.

The corPatch CPR disposable sensor can be used in all operating modes.

If a patient is under 8 years of age, the use of the corPatch CPR disposable sensor is not recommended.

During resuscitation the user must assess the status of the patient independently of the feedback information provided by the corPatch CPR sensor.

The corPatch CPR disposable sensor is covered under one or more of the following U.S.A. patents: 7,074,199; 7,108,665; 7,429,250; 8,147,433; 7,220,235

CPR rate

If the compressions performed by the user fall below a rate of 70 /min or exceed 150 /min, the corpuls1 no longer issues readings. The metronome indicates acoustically the compressions.

CPR compression depth

Speech- and text messages, as well as the colour of the bars in the CPR curve signal to the user whether the quality of the thorax compressions is sufficient (green bars) or can be optimised (red bars).

The corpuls1 represents thorax compressions also in green if they exceed the recommended depth.

Pertaining to CPR compression depth, there are three different speech- and text messages available:

- ⟨Push harder⟩
- ⟨Push harder, fully release⟩
- ⟨Good compressions⟩

If the recommended CPR compression depth of the thorax compressions has not been reached, the speech- and text message ⟨Push harder⟩ is played. It is repeated at an interval of 7 seconds until the recommended depth of the thorax compressions has been reached or exceeded. The device issues the voice- and text message ⟨Good compressions⟩.

In addition, if the compression depth has not been reached, the speech- and text message ⟨Fully release⟩ is played to remind the user to release the thorax. It can be deactivated by the OPERATOR in the configuration dialogue "Defib - CPR Feedback".

The message ⟨Fully release⟩ is played as a reminder for re-calibration of the sensor.

The speech- and text messages do not appear if:

- The device is charging in manual mode.
- During the ECG analysis in AED mode.
- The device is ready for releasing a defibrillation shock (first 10 s).
- The shock has been released in AED mode and until the message ⟨Perform CPR⟩ appears.
- The preShock phase is active in AED mode (up to approx. 30 s after ready for shock).
- The compression rate falls below 70 /min or exceeds 150 /min.
- The ventilation phase of the metronome is active, including the five higher-pitched compression tones indicating the upcoming ventilation phase.

If neither the AED- nor the manual mode is active and the curve is visible, as e. g. in monitoring mode or pacer mode, only voice messages, no text messages pertaining to the CPR depth appear.

The reference range of CPR compression depth is 5.0 cm to 6.0 cm / 2.0 in to 2.4 in

#### 10.10.1.1 Warnings

**WARNING!**

User error during application of CPR!

If the user does not completely release the pressure during the phase between compressions when administering CPR, the feedback from the corpuls1 may be negative.

► Release the pressure on the patient's chest completely during the phase between compressions.

**CAUTION**

Wrong application of the corPatch CPR disposable sensor!

If the corPatch CPR disposable sensor is applied for too long, the skin of the patient may be affected (red patches and skin irritation).

► Replace corPatch CPR disposable sensors at last 24 hours after first use.

**CAUTION**

Ineffective rest position of the corPatch CPR disposable sensor!

The detection of the rate and depth of chest compressions may be compromised by movement affecting the corPatch CPR disposable sensor.

► Protect the corPatch CPR disposable sensor from movement during complete application.

### 10.10.1.2 Supporting CPR with the corPatch CPR Disposable Sensor

When the following prerequisites are met, the user can start therapy.

To support the cardiopulmonary resuscitation with the corPatch CPR disposable sensor proceed as follows:

Prerequisite:

- ✓ The corPatch CPR disposable sensor is connected to the patient (see 10.6.4 corPatch CPR disposable sensor (Accessories) on page 84)
- ✓ AED mode (see 10.7.6 Calling up the Manual Mode on page 92) or manual mode (see 10.7.3 Calling up AED mode on page 88) is called up
- ✓ Metronome is activated (optional) (see 10.9.2 Starting or Stopping the Metronome on page 104)

1. Start chest compressions.

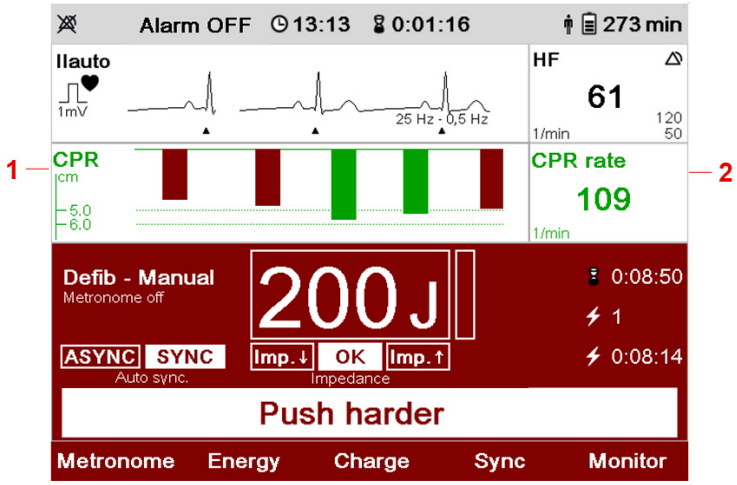



Fig. 10-20 corPatch CPR feedback information

1 Curve CPR compression depth

2 Vital parameter CPR rate

In the curve for CPR compression depth of the user interface, first green/red bars are visible.

2. One of the following situations occurs:

   a) The corpuls1 issues the voice- and text message ⟨Push harder⟩ or ⟨Push harder, fully release⟩.
   Adjust the CPR compression depth to the recommended CPR compression depth.

   b) The corpuls1 issues the voice- and text message ⟨Good compressions⟩.
   CPR compression depth is appropriate.

3. Continue or finish standardised or locally valid resuscitation protocol with chest compressions to completion.

   The CPR compression depth should be adjusted to the recommended CPR compression depth.

   Cardiopulmonary resuscitation is complete.

## 10.10.2 Working with primeCPR Feedback (Accessories)

When using the primeCPR feedback system, the compression rate and -depth of the CPR are measured and the device issues speech- and text messages. The user receives important information on the quality of the compressions and can react directly.

The patient's condition has to be assessed by the users themselves, independent of the CPR feedback.

The CPR curve signals the user, if the compression depth is sufficient (green bars), too shallow (red bars) or too deep (yellow bars).

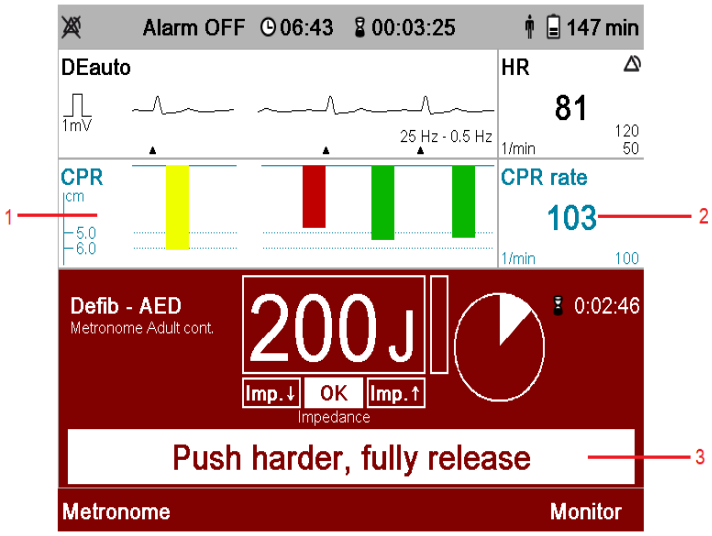



Fig. 10-21 primeCPR Feedback information

1 Display range Compression depth
2 Display range Compression rate
3 Display range Text information

**Speech- and text message**

Additionally, speech- and text messages are issued.

| | |
|---|---|
| ⟨Push harder, fully release⟩ | Compression depth too shallow, release the thorax between compression phases<br>Every 6 seconds until the recommended depth has been reached |
| ⟨Good compressions⟩ | Compressions are in the optimal range |

Tab. 10-9 Speech- and text message primeCPR

The message ⟨Fully release⟩ can be disabled by the operator.

In the following situations, no speech- and text messages are issued:

- during the ECG analysis in AED mode
- The shock has been released in AED mode and until the message ⟨Perform CPR⟩ appears
- The preShock phase is active in AED mode (up to approx. 30s after ready for shock)
- The device is charging in manual mode
- Ready for shock
- Compression rate is beyond the measurable range (< 70/min, >150/min)
- The metronome is in ventilation phase
- The resuscitation is finished

**CAUTION**

Risk of patient injury due to misinterpretation

Shocks or vibrations of the primeCPR feedback sensor can impair the interpretation of compression rate and -depth. Therapy errors resulting from that can lead to injury of the patient.

► Protect the primeCPR feedback sensor from shocks or vibrations during therapy.

**WARNING!**

Risk of injury due to unapproved accessories

Using unapproved accessories can lead to increased electromagnetic interference, decreased electromagnetic immunity and malfunctions. Falsified readings of the monitoring functions, delays or aborted therapy can cause serious injury.

► Make sure to use accessories provided or approved by the manufacturer.

**WARNING!**

Risk of patient injury due to misapplication

During the phase between compressions, the user has to make sure that the pressure is completely relieved from the thorax. Otherwise, there can be false-negative feedback. Therapy errors resulting from that can lead to injury of the patient.

► Continue standardised or locally valid resuscitation protocol with chest compressions

► Mind the device information

To use the primeCPR feedback system, proceed as follows:

Prerequisite:

✓ The device is switched on

✓ primeCPR feedback sensor has been attached to the patient Fig. 10-12 Application note for the primeCPR feedback sensor

✓ Therapy mode is called up (Manual mode (see 10.7.6 Calling up the Manual Mode on page 92) or AED mode (see 10.7.3 Calling up AED mode on page 88))

✓ Metronome is activated (optional) (see 10.9.2 Starting or Stopping the Metronome on page 104)

1. Start chest compressions.

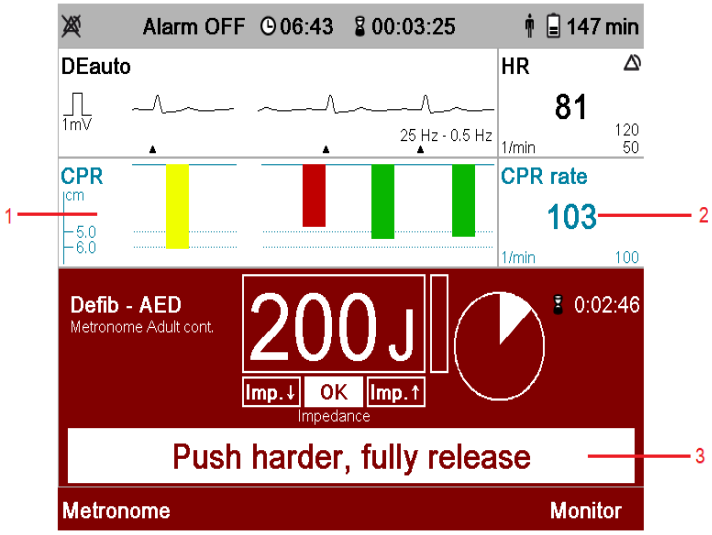



Fig. 10-22 primeCPR Feedback information

1 Display range Compression depth

2 Display range Compression rate

3 Display range Text information

primeCPR feedback system starts automatically.

2. Perform the chest compressions compliant to the speech- and text messages of the device and adjust the measures if necessary.

3. Continue or finish standardised or locally valid resuscitation protocol with chest compressions to completion.

## 10.11 End Therapy Mission

To finish the mission, proceed as follows:

1. Remove the used therapy electrodes and CPR Feedback sensors from the patient.
2. Dispose of the therapy electrodes and CPR Feedback sensors professionally.
3. Review and save mission data (see 11 Mission Data Management on page 112).
4. Clean and disinfect the device and the used accessories (see 14.6 Cleaning and Disinfection on page 168).

# 11 Mission Data Management

This chapter contains information on mission data storage in the corpuls1 and how to handle the SD card.

## 11.1 Mission Data Storage

With each switch-on, the corpuls1 generates automatically a new mission data set and an unambiguous mission number. Within this mission data set, all events are marked with a timestamp (date and time) and can be allocated to patient data.

During the mission the corpuls1 stores all generated mission data in the internal memory as e.g. vital parameters, curves, alarm data and entries in the alarm history, audio recordings or screenshots. In the internal memory of the device, a maximum of 25 typical missions can be stored, which remain secure even in the event of a power failure. During the mission, the corpuls1 stores finished mission data sets that are not yet transferred to the SD card. The symbol in the status line indicates that the data are being saved.

If the user switches off the corpuls1 (see 5.2 Switching the device on and off on page 34), the corpuls1 saves all generated mission data from the internal memory to the SD card.

All saved mission data can be viewed with the evaluation software **corpuls.manager REVIEW** . Thus, e.g. for alarm events date and time from the beginning to the end of the alarm condition, as well as the associated alarm limits are logged.

If the user switches off the corpuls1 and switches the corpuls1 on again, the entries in the alarm history have been deleted and are no longer available.

### 11.1.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

NOTICE

Premature removal of the SD card!

Can lead to data loss due to data being saved incorrectly or not at all.

- ► If the symbol appears in the status line, the SD card must remain inserted in the corpuls1 and the corpuls1 must remain switched on.
- ► Before removing the SD card, switch off the corpuls1.

## 11.2 SD card (Accessories)

The SD card allows to save all generated mission data and to view those with **corpuls.manager REVIEW** (P/N 04135) on a PC. To be able to assign the generated mission data unequivocally, the user has to configure the date and the time (see 12.9 Menu item System on page 130).

# 12 Settings Main menu

The user can log in to the corpuls1 at different user levels. Logging in is only possible at one user level at a time. For every authorisation level, different settings are available.

This chapter describes the settings for the user DEFAULT and the user MAN. DEFIB.. This chapter is structured analogously to the menu.

## 12.1 Overview Settings

The following illustration gives an overview of the user interface elements.

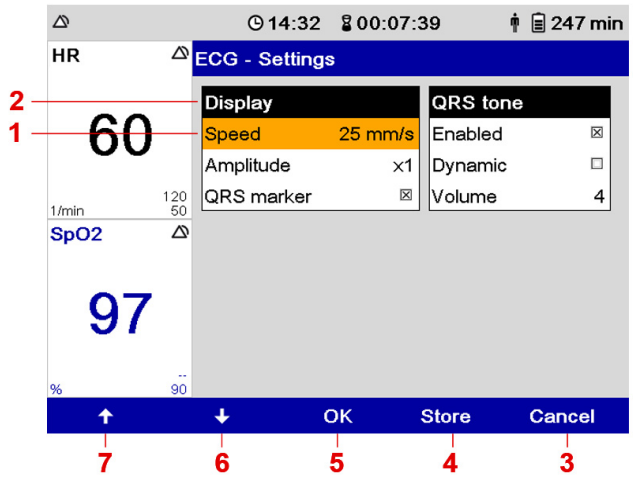



Fig. 12-1 Overview Settings

| Item | Element | Description |
|---|---|---|
| 13 | List box | Indicates the currently selected setting. |
| 2 | List | Indicates a list. A list contains one or more list boxes. |
| 3 | Softkey [Cancel] | The following functions are available: Cancel selection, close element without saving changes. |
| 4 | Softkey [Store] | Allows to save changed settings until the user switches off the corpuls1. |
| 5 | Softkey [OK] | The following functions are available: Select and confirm settings, activate ☒ and deactivate ☐ checkbox. |
| 6 | Softkey [Down] | The following functions are available: Navigate between list boxes and between settings. |
| 7 | Softkey [Up] | The following functions are available: Navigate between list boxes and between settings. |

Tab. 12-1 Overview Settings

## 12.2 Changing settings

If a submenu is called up, the user can change settings.

To change settings, proceed as follows:

1. Navigate to the list box by pressing the softkey [Up] or [Down].
   The list box is marked in yellow.
2. Select setting by pressing softkey [OK].
   The current setting is emphasised in bold font.

To abort the process, press softkey [Cancel].

3. Navigate between the settings by pressing the softkey [Up] or [Down] and confirm the required setting with the softkey [OK].

If the list box has a checkbox, select ☒ or deselect ☐ the checkbox by pressing the softkey [OK].

4. To change further settings, repeat steps 1 to 3.
5. The following options are available:
   a) To save the settings, press softkey [Store].
      The menu is closed. The settings will be stored until the user switches off the corpuls1.
   b) To retain the previous settings and close the menu, press the softkey [Cancel].
      The menu is closed. The settings have not been stored.

## 12.3 Menu item Alarms

The menu item ***Alarms*** allows to configure settings for alarms.

### 12.3.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Potential danger with regard to alarm presettings when changing to another area of application!

If the user moves to a application area where other alarm presets are needed, the currently set alarm presets may be inappropriate and result in misinterpretations.

► When changing to another application area, adjust the alarm presets.

### 12.3.2 Submenu item Limits

The submenu item *> **Limits*** allows to set alarm limits for vital parameters. The lower limit and the upper limit can be configured by the user for the patient groups Adult, Child and Neonate.

To open the configuration dialogue, proceed as follows:

1. In the menu *Alarms* select *> Autolimits*.
   The configuration dialogue for selecting the patient group Adult is open.

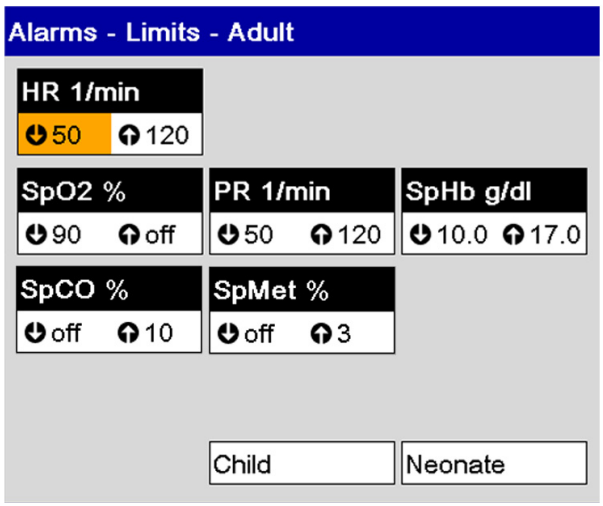



Fig. 12-2 Configuration Alarm limits (example adult)

   The list box *HR 1/min* is open and the lower alarm limit is marked in yellow.

2. Press softkey [OK].
3. Set lower alarm limit.
   Navigate to the required alarm limit by pressing the softkey [Up] or [Down] and confirm with softkey [OK].

To navigate quickly through the characters hold down the softkey [Up] or [Down] for approx. 2 s. until the required value has been reached.

If necessary, combine with individual steps.

4. Navigate to the upper alarm limit by pressing the softkey [Down] and confirm with softkey [OK].
5. Enter upper limit.
   Navigate to the required alarm limit by pressing the softkey [Up] or [Down] and confirm with softkey [OK].
6. Navigate to the next list box *SpO2 %* by pressing the softkey [Down].
   The list box *SpO2 %* is open and the lower alarm limit is marked in yellow.
7. Repeat steps 2 - 5 until all necessary alarm limits are set.

The list box *Child* allows switching to the limits for the patient group Child. The list box *Neonate* allows switching to the limits for the patient group Neonate.

List ***Alarm limits***

| List box | Description | Values |
|---|---|---|
| HR 1/min | Allows to change the lower alarm limit for the heart rate. | 25 /min to 150 /min, in increments of five |
| | Allows to change the upper alarm limit for the heart rate. | 70 /min to 250 /min, in increments of five |
| SpO2 % | Allows to change the lower alarm limit for the peripheral oxygen saturation. | Off; 65 % to 99 %, in increments of one |
| | Allows to change the upper alarm limit for the peripheral oxygen saturation. | 90 % to 100 %, in increments of one; Off |
| PR 1/min | Allows to change the lower alarm limit for the peripheral pulse rate. | Off; 25 /min to 100 / min, in increments of five |
| | Allows to change the upper alarm limit for the peripheral pulse rate. | 70 /min to 200 /min, in increments of five |
| SpCO % (Available only with Masimo Rainbow SET Technology) | Allows to change the lower alarm limit for the peripheral carboxyhaemoglobin concentration. | Off; 0 % to 100 %, in increments of one |
| | Allows to change the upper alarm limit for the peripheral carboxyhaemoglobin concentration. | 1 % to 100 %, in increments of one; Off |
| SpMet % (Available only with Masimo Rainbow SET Technology) | Allows to change the lower alarm limit for the peripheral methaemoglobin concentration. | Off; 0 % to 100 %, in increments of one |
| | Allows to change the upper alarm limit for the peripheral methaemoglobin concentration. | 1 % to 100 % in increments of one; Off |
| SpHb g/dl (Available only with Masimo Rainbow SET Technology) | Allows to change the lower alarm limit for the total haemoglobin levels. | Off; 3.0 g/dl to 12.0 g/dl, in steps of 0.1 |
| | Allows to change the upper alarm limit for the total haemoglobin levels. | 10.0 g/dl to 22.0 g/dl, in steps of 0.1 |
| SpHb mmol/l (Available only with Masimo Rainbow SET Technology) | Allows to change the lower alarm limit for the total haemoglobin levels. | Off; 1.9 mmol/l to 7.5 g/dl, in steps of 0.1 |
| | Allows to change the upper alarm limit for the total haemoglobin levels. | 6.2 mmol/l to 13.7 g/dl, in steps of 0.1 |

Tab. 12-2 Limits - List Alarm limits

The corpuls1 does not allow to enter overlapping values for the upper and lower alarm limits. Setting extreme alarm limits may render the alarm system useless.

Exception with the lower alarm limit of SpO2:
If the user disables the vital parameter SpO2 and the value of the lower alarm limit is less than 90 %, the corpuls1 automatically increases the lower alarm limit to 90 %.

There are no alarm limits for the vital parameter perfusion index (PI). Therefore the list box Vital parameter autolimits is not available. If there is low perfusion, the corpuls1 issues the alarm message ✦Oxi: Low perfusion✦. The vital parameter field is inverted.

### 12.3.3 Submenu item Autolimits

The submenu item *> Auto limits* allows to set automatic limits for the vital parameters. The lower limit and the upper limit can be configured by the user for the currently selected patient class. The user can adopt the autolimits also via the vital parameter context menu .(see 6.4 Vital parameter context menu on page 45)

To open the configuration dialogue, proceed as follows:

1. In the menu *Alarms* select *> Auto limits*.
   The configuration dialogue is open.

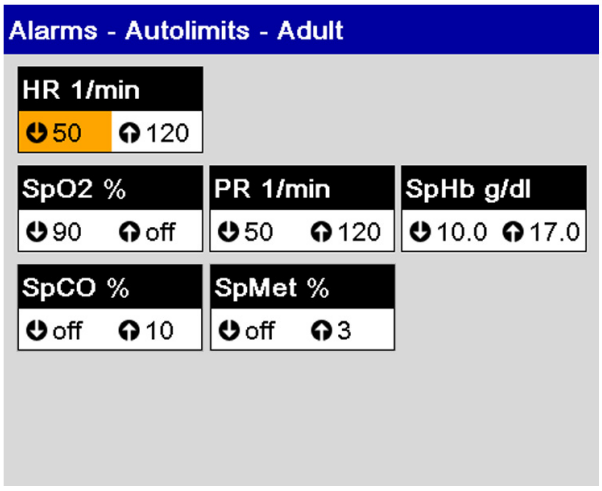



Fig. 12-3 Configuration Alarm autolimits

### 12.3.4 Submenu item Settings

The submenu item *> Settings* allows to change the volume of alarms.

To open the configuration dialogue, proceed as follows:

1. In the menu *Alarms*, select *> Settings*.
   The configuration dialogue is open.

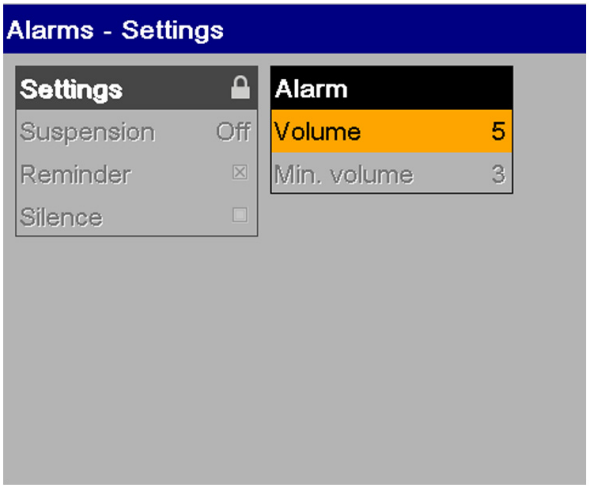



Fig. 12-4 Settings Alarms

List ***Alarm***

| List box | Description | Values |
|---|---|---|
| Volume | Allows to change the volume of the alarms. | 3 to 10,<br>in increments of one<br>3 = soft<br>10 = loud |

Tab. 12-3 Settings Alarms - List Alarms

The user DEFAULT/MAN. DEFIB. cannot set the volume below the minimal volume.

## 12.4 Menu item Signals

The menu item ***Signals*** allows to configure settings of the displayed curves and vital parameters.

### 12.4.1 Submenu item Curves

The submenu item *> **Curves*** allows to configure which curves are displayed in monitoring mode.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Signals***, select *> **Curves***.
   The configuration dialogue is open.

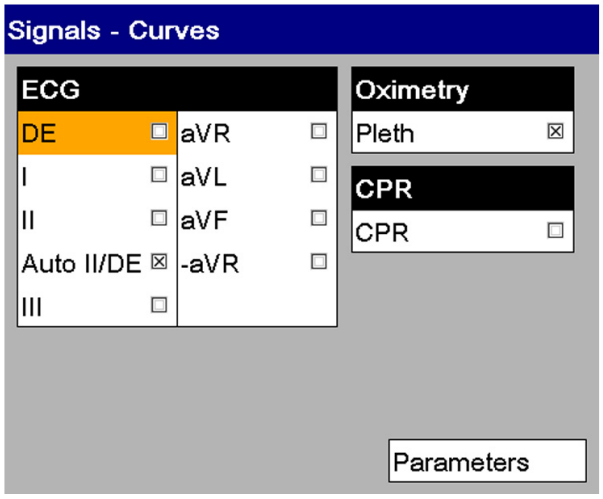



Fig. 12-5 Settings Curves

The list box *Parameters* allows switching to the parameter settings.

The corpuls1 can display a maximum of three curves in monitoring mode.

To display a third curve in monitoring mode, the vital parameter position should be set to *Left* or *Right*, not to *Top*.

List ***ECG***

| List box | Description | Values |
|---|---|---|
| *DE* | Allows to show or hide the DE lead. | ☒; ☐ |
| *I* | Allows to show or hide the I lead. | ☒; ☐ |
| *II* | Allows to show or hide the II lead. | ☒; ☐ |
| Auto *II*/DE | Allows to show or hide the Auto II/DE lead. | ☒; ☐ |
| *III* | Allows to show or hide the III lead. | ☒; ☐ |
| *aVR* | Allows to show or hide the aVR lead. | ☒; ☐ |
| *aVL* | Allows to show or hide the aVL lead. | ☒; ☐ |
| *aVF* | Allows to show or hide the aVF lead. | ☒; ☐ |
| *-aVR* | Allows to show or hide the -aVR lead. | ☒; ☐ |

Tab. 12-4 Settings Curves - List ECG

List ***Oximetry***

| List box | Description | Values |
|---|---|---|
| Pleth | Allows to show or hide the pleth curve. | ☒; ☐ |

Tab. 12-5 Settings Curves - List Oximetry

List ***CPR***

| List box | Description | Values |
|---|---|---|
| CPR | Allows to show or hide the CPR curve. | ☒; ☐ |

Tab. 12-6 Settings Curves - List CPR

### 12.4.2 Submenu item Parameters

The submenu item *> **Parameters*** allows to configure which parameter fields are displayed in monitoring mode. Allows to configure the position of the vital parameter fields and to select the interval for trends.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Signals***, select *> **Parameters***.
   The configuration dialogue is open.

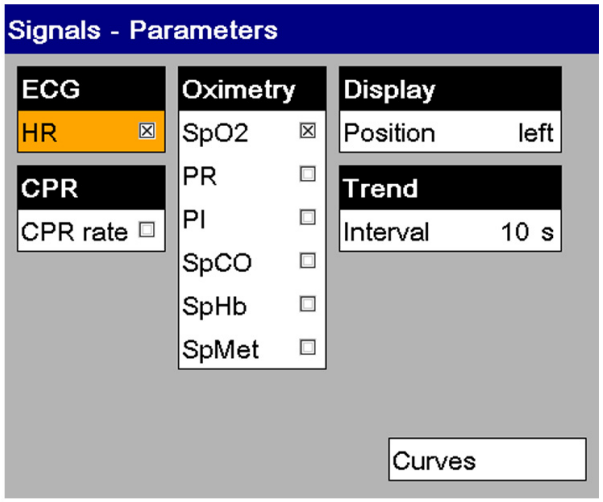



Fig. 12-6 Settings Vital parameters

The list box *Curves* allows switching to the curve settings.

The corpuls1 can display a maximum of four vital parameters in monitoring mode, depending on the position of the vital parameters.

If the vital parameter position is set to *Left* or *Right*, the corpuls1 can display three curves simultaneously, but not if set to *Top*.

List ***ECG***

| List box | Description | Values |
|---|---|---|
| HR | Allows to show or hide the vital parameter field HR. | ☒; ☐ |

Tab. 12-7 Settings Vital parameters - List ECG

List ***Oximetry***

| List box | Description | Values |
|---|---|---|
| SpO2 | Allows to show or hide the vital parameter field SpO2. | ☒; ☐ |
| PR | Allows to show or hide the vital parameter field PR. | ☒; ☐ |
| PI | Allows to show or hide the vital parameter field PI. | ☒; ☐ |
| SpCO | Allows to show or hide the vital parameter field SpCO. | ☒; ☐ |
| SpHb | Allows to show or hide the vital parameter field SpHb. | ☒; ☐ |
| SpMet | Allows to show or hide the vital parameter field SpMet. | ☒; ☐ |

Tab. 12-8 Settings Vital parameters - List Oximetry

List ***Display***

| List box | Description | Values |
|---|---|---|
| Item | Allows to change the position of the vital parameter fields on the screen. | Left, top, right |

Tab. 12-9 Settings Vital parameters - List Display

List ***Trend***

| List box | Description | Values |
|---|---|---|
| Interval | Allows to change the interval at which the corpuls1 records the readings of the displayed vital parameters. From these recorded readings the corpuls1 calculates a mean value for each displayed vital parameter. The user can view the logged mean values with **corpuls.manager REVIEW**. | 10 s to 60 s,<br>in steps of 10 J |

Tab. 12-10 Settings Vital parameters - List Trend

List ***CPR***

| List box | Description | Values |
|---|---|---|
| CPR rate | Allows to show or hide the CPR rate. | ☒;<br>☐ |

Tab. 12-11 Settings Vital parameters - List CPR

### 12.4.3 Submenu item Views

The submenu item *> **Views*** allows to store select or also to store four views for the monitoring mode. The factory settings of the corpuls1 include default settings for four views (see XI Factory Settings on page 238). These views are available to the user for the current mission.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Signals***, select *> **Views***.

   The configuration dialogue is open.

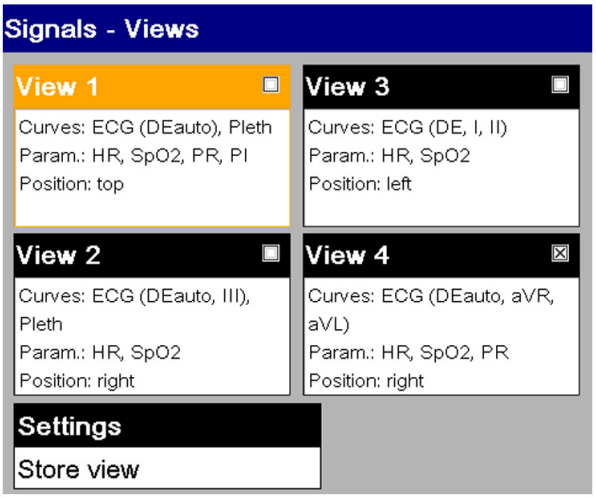



Fig. 12-7 Settings Views

To save a selected view, proceed as follows:

Requirements:

- ✓ The required curves have been configured for a new view in the menu ***Signals*** > ***Curves*** (see 12.4.1 Submenu item Curves on page 118)
- ✓ The required vital parameters have been configures for a new view in the menu ***Signals*** > ***Parameters*** (see 12.4.2 Submenu item Parameters on page 119)
- ✓ The menu ***Signals*** > ***Views*** has been opened

1. Navigate to the list box *Store view* by pressing the softkey [Up] or [Down] and confirm by pressing the softkey [OK].
2. To store the selected view, navigate with the softkey [Up] or [Down] to the required view (e. g. *View 2*) and confirm with the softkey [OK].

   The selected view has been stored. In the configuration dialogue "Signals - Views" the configuration can be reviewed in the selected view (e..g. *View 2*).

If the configuration has been stored in the system settings by the user OPERATOR, the new views are available permanently.

The corpuls1 deletes a stored view by overwriting it with a new view.

To retain the previous settings and close the configuration dialogue, press the softkey [Cancel].

To select a view, proceed as follows:

1. Navigate to the required view by pressing the softkey [Up] or [Down] and confirm with softkey [OK].

   The checkbox is selected .

The view can also be chosen via the softkey context menu Views (see 6.6.2 Softkey Context Menu View on page 51)

## 12.5 Menu item ECG

The menu item ***ECG*** allows to configure settings for ECG monitoring.

### 12.5.1 Submenu item Settings

The submenu item > ***Settings*** allows to change the representation of the ECG and settings for the QRS tone.

To open the configuration dialogue, proceed as follows:

1. In the menu ***ECG***, select > ***Settings***.

   The configuration dialogue is open.

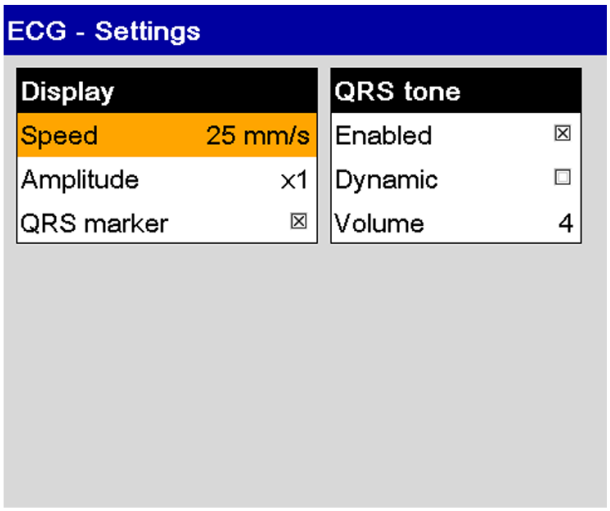



Fig. 12-8 Settings ECG

List ***Display***

| List box | Description | Values |
|---|---|---|
| Speed | Allows to select the sweep speed for the ECG curve. | 12.5 mm/s, 25 mm/s, 50 mm/s<br>in steps of 10 J |
| Amplitude | Allows to change the amplitude of the ECG curve. | x0.25 to x2; Auto<br>x0.25 = flat amplitude<br>x2 = high amplitude<br>Auto = automatic adjustment |
| QRS marker | Allows to show or hide the QRS markers. | ☒;<br>☐ |

Tab. 12-12 ECG Settings - List Display

List ***QRS Tone***

| List box | Description | Values |
|---|---|---|
| Enabled | Allows to enable or disable the QRS tone. | ☒;<br>☐ |
| Dynamic | The pitch of the QRS tone changes in relation on the oxygen saturation.<br>A high-pitched tone signals good oxygen saturation. A low-pitched tone signals poor oxygen saturation.<br>NOTE:<br>The dynamic QRS tone is only available, if the device is equipped with the pulse oximetry option (see 9.7 Pulse oximetry (option) on page 71). | ☒;<br>☐ |
| Volume | Allows to change the volume of the QRS tone. | 3 to 10,<br>in steps of one<br>3 = soft<br>10 = loud |

Tab. 12-13 ECG Settings - List QRS tone

## 12.6 Menu item Defib

The menu item ***Defib*** allows to configure settings for the defibrillation mode.

### 12.6.1 Submenu item Metronome

The submenu item *> **Metronome*** allows to change the volume of compression tones and ventilation tones of the metronome.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **Metronome***.
   The configuration dialogue is open.

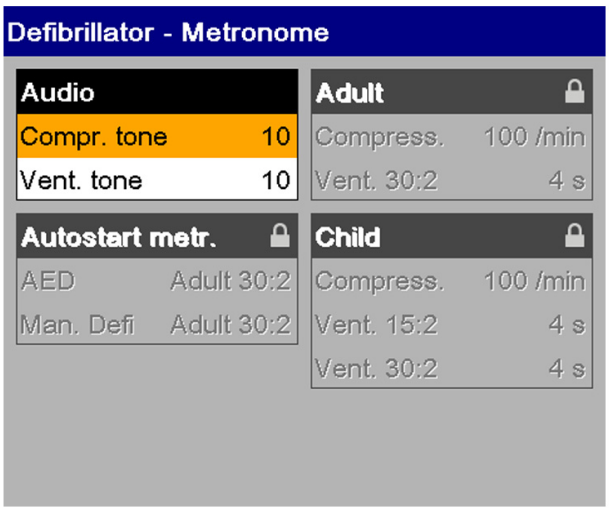



Fig. 12-9 Settings Metronome

List ***Audio***

| List box | Description | Values |
|---|---|---|
| Compr. tone | Allows to change the volume of the compression tone of the metronome. | 3 to 10,in steps of one<br>3 = soft<br>10 = loud |
| Vent. Tone | Allows to change the volume of the QRS tone. | 3 to 10,in steps of one<br>3 = soft<br>10 = loud |

Tab. 12-14 Settings Metronome - List Audio

### 12.6.2 Submenu corPatch CPR

The submenu item *> **CPR*** allows to configure settings for the corPatch CPR function.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **CPR***.
   The configuration dialogue is open.

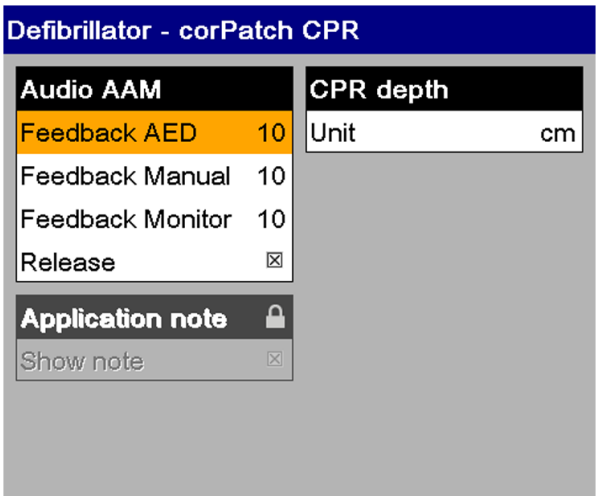



Fig. 12-10 Settings corPatch CPR

List ***Application note***

| List box | Description | Values |
|---|---|---|
| Show note | Allows to display an application note concerning the use of the corPatch CPR disposable sensor in AED-and manual mode. | ☒; ☐ |

Tab. 12-15 Settings corPatch CPR - List Application note

### 12.6.3 Submenu primeCPR

The submenu *> CPR* allows to configure settings for the primeCPR feedback system..

To open the configuration dialogue, proceed as follows:

1. In the menu *Defib*, select *> CPR*.

   The configuration dialogue opens.

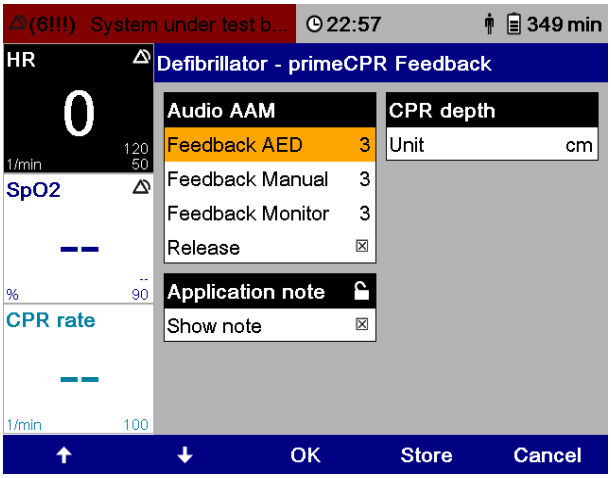



Fig. 12-11 Configuration dialogue primeCPR feedback

The following configuration options are available:

| List box | Description | Values |
|---|---|---|
| Show note | The application note for attaching and positioning the feedback sensor can be enabled or disabled. | ☒; ☐ |

Tab. 12-16 Configuration options for primeCPR feedback (default)

Some settings require the rights of the user level OPERATOR (see 13 Settings Main menu (User level OPERATOR) on page 137).

## 12.7 Menu item Oximetry

The menu item ***Oximetry*** allows to configure settings for pulse oximetry monitoring.

### 12.7.1 Submenu item Settings

The submenu item *> **Settings*** allows to change the representation of the plethysmogramme, the settings of the pulse tone and further settings for pulse oximetry monitoring.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Oximetry***, select *> **Settings***.

   The configuration dialogue is open.

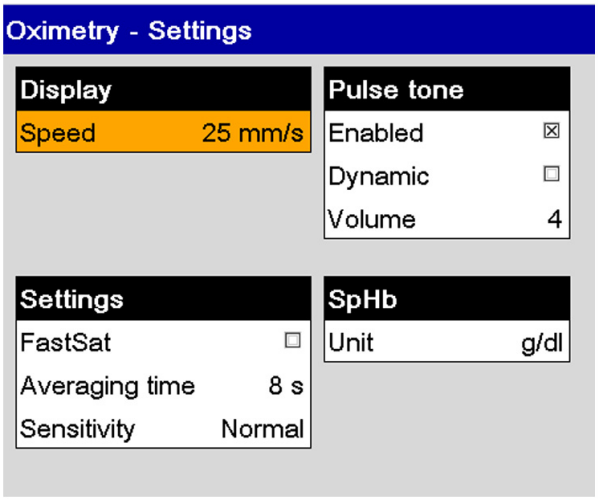



Fig. 12-12 Settings Pulse oximetry

List ***Display***

| List box | Description | Values |
|---|---|---|
| Speed | Allows to select the sweep speed for the plethysmogramme. | 12.5 mm/s,<br>25 mm/s,<br>50 mm/s |

Tab. 12-17 Settings Pulse oximetry - List Display

List ***Settings***

| List box | Description | Values |
|---|---|---|
| FastSat | Allows to enable or disable the FastSat® algorithm. | ☒;<br>☐ |
| Averaging time | Allows to change the averaging time.<br>The longer the averaging time, the more stable are the measured values. Longer averaging times delay the response of the pulse oximeter and reduce the measured variations of SpO2 and pulse rate. | 2 s to 4 s,<br>4 s to 6 s,<br>8 s,<br>10 s,<br>12 s,<br>14 s,<br>16 s |
| Sensitivity | Allows to adapt the sensitivity of the pulse oximeter.<br>*Normal*: Recommended for typical monitoring situations in which patients are monitored continuously, as e.g. in intensive care units.<br>*APOD*™: Recommended for situations where there is a high probability of the pulse oximetry sensor becoming detached from the patient or where patients are not visually monitored continuously. Offers a safe and fast detection if the pulse oximetry sensor is loose and therefore erroneous readings for pulse rate and arterial oxygen saturation are detected.<br>*MAX*: Recommended for patients with low perfusion and when the corpuls1 issues an alarm in APODTM or Normal sensitivity mode. This mode is not recommended for situations where patients are not continuously monitored visually. Offers no protection if the pulse oximetry sensor is loose and therefore erroneous readings for pulse rate and arterial oxygen saturation are detected. | *Normal*,<br>*APOD*™,<br>MAX |

Tab. 12-18 Settings Pulse oximetry - List Settings

List ***Pulse tone***

| List box | Description | Values |
|---|---|---|
| Enabled | Allows to enable or disable the pulse tone.<br>As long as the QRS tone (see 12.5 Menu item ECG on page 122) is sounding, the pulse tone is muted. | ☒;<br>☐ |
| Dynamic | Allows to enable or disable the dynamic pulse tone.<br>If the checkbox is selected the pitch of the pulse tone changes in relation to the oxygen saturation. The pulse tone has to be activated. A high-pitched tone signals good oxygen saturation. A low-pitched tone signals poor oxygen saturation. If the checkbox is deselected the pulse tone does not change in relation to the oxygen saturation. | ☒;<br>☐ |
| Volume | Allows to change the volume of the pulse tone. | 3 to 10,<br>in increments of one<br>3 = soft<br>10 = loud |

Tab. 12-19 Settings Pulse oximetry - List Pulse tone

List ***SpHb***

| List box | Description | Values |
|---|---|---|
| Unit | Allows selecting a different measurement unit for SpHb. | g/dl, mmol/l |

Tab. 12-20 Settings Pulse oximetry - List SpHb

### 12.7.2 Submenu item Info

The submenu item > ***Info*** allows to display information on the pulse oximetry measuring options.

To open the information on the system, proceed as follows:

1. In the menu ***Oximetry***, select > ***Info***.
   Information on the oximetry function is open.

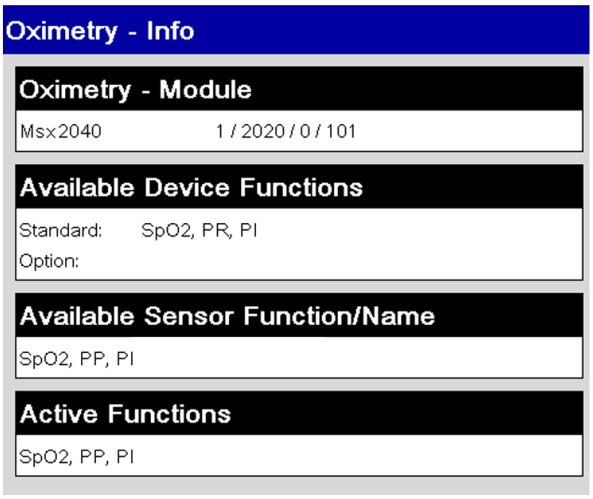



Fig. 12-13 Information Pulse oximetry function

## 12.8 Menu item Patient

The menu item ***Patient*** allows to enter data pertaining to the patient and to display screenshots.

### 12.8.1 Submenu item Screenshots

The submenu item > ***Screenshots*** allows to display screenshots.

To display the saved screenshots, proceed as follows:

1. In the menu ***Patient***, select > ***Screenshots***.
   The screenshot viewer shows the most recent screenshot. The status line shows the symbol .

### 12.8.2 Submenu item Patient class/-group

The submenu item > ***Patient class*** allows to select the patient class/-group.

To select a patient group, proceed as follows:

1. In the menu *Patient*, select *> Patient class*.
   The submenu item is open.


Fig. 12-14 Select patient class/-group.

To abort the process, press softkey [Cancel].

2. Select patient class/-group with the softkeys.
   The status line shows the symbol for the patient class/-group (see 6.1 Structure of the user interface on page 41).

### 12.8.3 Submenu item Enter data

The submenu item *> Enter data* allows to enter patient data.

To enter patient data, proceed as follows:

1. In the menu *Patient*, select *> Enter data*.
   The patient data are open.

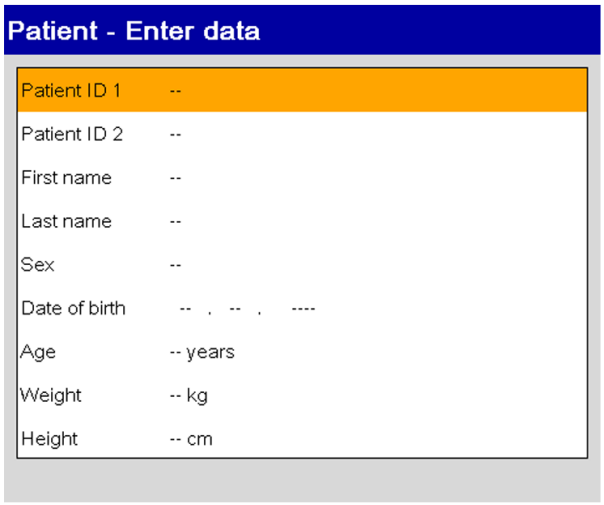



Fig. 12-15 Overview Patient data

2. Navigate to the list box (*Patient ID1/2*, *Last name/name*) by pressing the softkey [Up] or [Down].
   The list box is marked in yellow.
3. Press softkey [OK].
   The input window for entering data is open.


Fig. 12-16 Entering patient data

4. Entering patient data.
   Navigate with softkey [Right] to the required character (single steps or quick pass through (see 12.3.2 Submenu item Limits on page 114)) and press softkey [OK]. Navigate to other characters with softkey [Right] or [Left] and press softkey [OK].
   By selecting the symbol < the user OPERATOR can delete the last entry.

5. Press softkey [Save].
   The list box entry is saved.
6. To enter further data, repeat steps2 to 4.
7. Navigate to the list box *Sex* by pressing the softkey [Up] or [Down].
   The list box is marked in yellow.
8. Press softkey [OK].
   The input window for entering data is open.
9. Navigate to the required value (*--*, *male*, *female*) by pressing the softkey [Up] or [Down] and confirm with softkey [OK].
   The list box entry *Sex* is saved.
10. Navigate to the list boxes (*Date of birth*, *Age*, *Weight*, *Height*) by pressing the softkey [Up] or [Down].
    The list box is marked in yellow.
11. Press softkey [OK].
    The input window for entering data is open.
12. To enter the *Birth date*, navigate to the required value with the softkeys [Up], [Down], to enter *Age*, *Weight* and *Height* with the softkeys [Right] or [Left] (individual steps or quick pass through (see Fig. 12-2 Configuration Alarm limits (example adult) on page 115)) and confirm with softkey [OK].
    The list box is marked in yellow for *Date of birth*, then successively for *Day*, *Month* and *Year*.

After a value has been entered in the list box *Date of birth* the list box *Age* is greyed out.

The list boxes show the entered patient data.

## 12.9 Menu item System

The menu item ***System*** allows to open the mission administration, to configure system settings for the corpuls1 and to display system information on the corpuls1. The user can log in at another user level.

### 12.9.1 Submenu item Mission

The submenu item *> **Mission*** allows to mark the current mission as test mission.

Opening the mission administration

To open the mission administration, proceed as follows:

1. In the menu ***System***, select *> **Mission***.
   The mission administration is open and allows to mark the current mission as test mission.

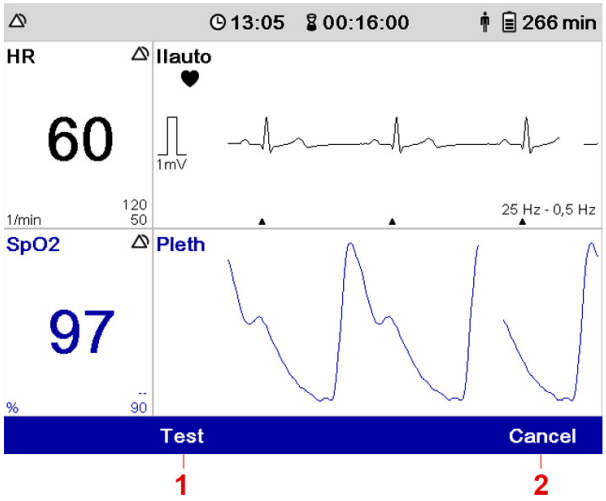



Fig. 12-17 Mission administration

1 Softkey [Test]
2 Softkey [Cancel]

Test mission

The user can mark the current mission as test mission.

The corpuls1 recognises a connected **Testload**/**Testbox**/**corpuls simulator** and automatically offers to mark this mission as test mission. The confirmation prompt ⟨Mark as test mission?⟩ appears.

To mark the current mission as test mission, proceed as follows:

1. Press softkey [Test].
   The confirmation prompt ⟨Mark as test mission?⟩ appears.

To abort the process, press softkey [Cancel].

2. Press softkey [OK].
   The dialogue closes. The current mission has been marked as test mission. Marking the mission as a test mission does not influence the mission data, but allows to filter the mission data in **corpuls.manager REVIEW**.

## 12.9.2 Submenu item Settings

The submenu item *> **Settings*** allows to configure system settings for the corpuls1.

To open the system settings, proceed as follows:

1. In the menu ***System***, select > ***Settings***.
   The system settings (1) are open.

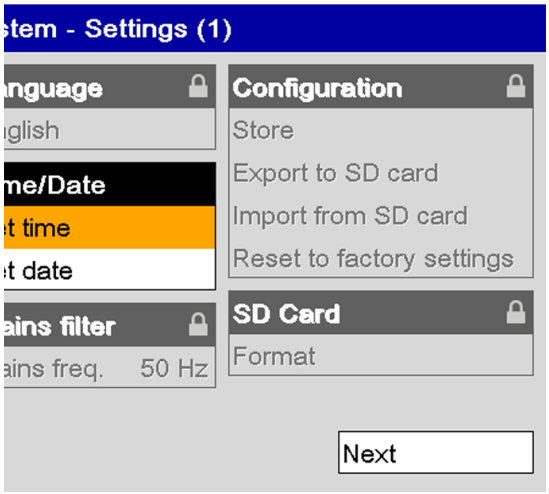



Fig. 12-18 System settings (1)

2. Press softkey [OK].
   The list box *Set Time* is marked in yellow.
3. Enter the value.
   Navigate to the required value by pressing the softkey [Up] or [Down] and confirm with softkey [OK].

The user can navigate to the required value by using individual steps or the quick pass through (see 12.3.2 Submenu item Limits on page 114).

   The minute value is marked in yellow.
4. Enter the value.
   Navigate to the required value by pressing the softkey [Up] or [Down] and confirm with softkey [OK].
5. Navigate to the list box *Set Date* by pressing the softkey [Down].
   The list box *Set date* is marked in yellow.
6. Press softkey [OK].
   The list box *Set Date* is open and the day value marked in yellow.
7. Enter the value.
   Navigate to the required value by pressing the softkey [Up] or [Down] and confirm with softkey [OK].
   The month value is marked in yellow.
8. To enter values for month and year, repeat step 7.

List ***Time/Date***

| List box | Description | Values |
|---|---|---|
| Set time | Allows to set the current time. | Hours (h) and minutes (m), in format *hh:mm* |
| Set date | Allows to set the current date. | Days (d), months (m) and years (y), in format *dd:mm:yyyy* |

Tab. 12-21 System settings (1) - List Time/Date

The list box *Next* allows to navigate to System settings (2).

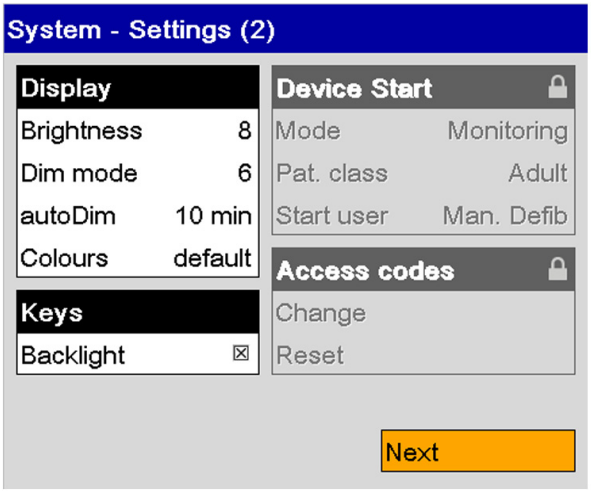



Fig. 12-19 System settings (2)

List ***Display***

| List box | Description | Values |
|---|---|---|
| Brightness | Allows to adjust the brightness of the display. | 1 to 10, in increments of one<br>1 = dark<br>10 = light |
| Dim mode | Allows to adjust the brightness of the display to energy saving Dim mode. | 1 to 7, in increments of one<br>1 = dark<br>7 = light |
| autoDim | Allows to select the time period after which the display is automatically dimmed.<br>If the user does not work with the corpuls1 within the configured time period or no new alarm is issued or confirmed, the display is automatically dimmed.<br>If the value *Off* is selected, the display is not automatically dimmed. | 2 min to 10 min, in steps of one;<br>off |
| Colours | Allows to adjust the colour settings of the display. | Default,<br>inverted |

Tab. 12-22 System settings (2) - List Display

List ***Keys***

| List box | Description | Values |
|---|---|---|
| Backlight | Allows to enable or disable in AED mode the backlighting of the **Analyse** key and the **Shock** key.<br>Allows to enable or disable in manual mode the backlighting of the **Shock** key. If the user is expected to press one of those keys, the respective key is flashing red. | ☒;<br>☐ |

Tab. 12-23 System settings (2) - List Keys

The list box *Next* allows to navigate to the Master data.

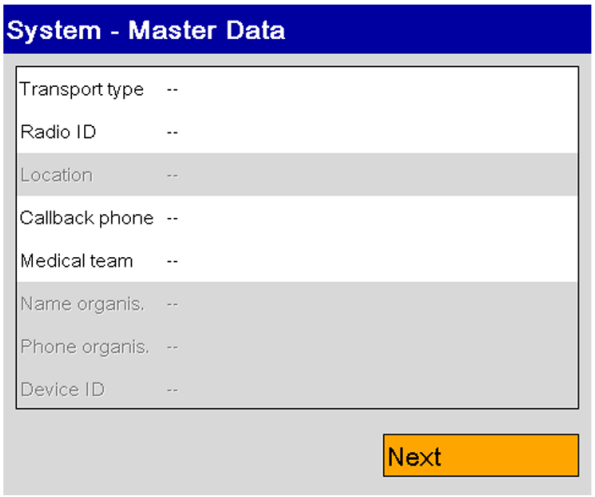



Fig. 12-20 Master data

The user can enter master data in monitoring mode.

To enter master data, proceed as follows:

1. Navigate to the list box by pressing the softkey [Up] or [Down].
   The list box is marked in yellow.
2. Press softkey [OK].
   The input window for entering data is open.


Fig. 12-21 Entering master data

3. Entering master data.
   Navigate with softkey [Right] to the required character (single steps or quick pass through (see 12.3.2 Submenu item Limits on page 114)) and press softkey [OK]. Navigate to other characters with softkey [Right] or [Left] and press softkey [OK].
   By selecting the symbol < the user OPERATOR can delete the last entry.
4. To enter further master data, repeat steps 1 to 3.
   The list boxes show the entered master data.

### 12.9.3 Submenu item Info

The system information displays the respective versions of software- and hardware components.

To open system information, proceed as follows:

1. In the menu ***System***, select > ***Info***.
   The system information 1 is open.

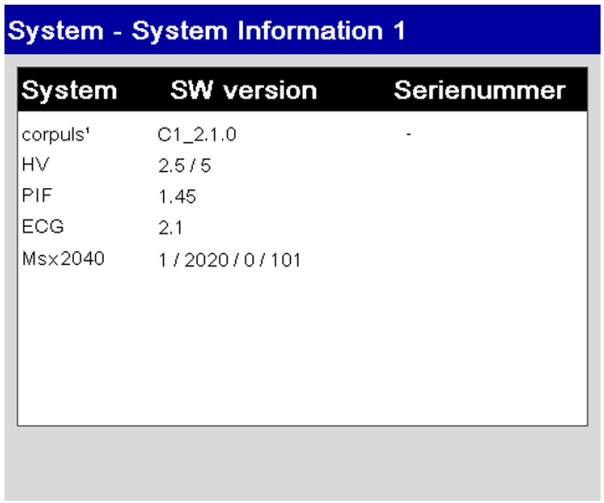



Fig. 12-22 System information 1

2. The softkey [SysInfo2] allows to navigate to System information 2.
   The system information 2 is open.

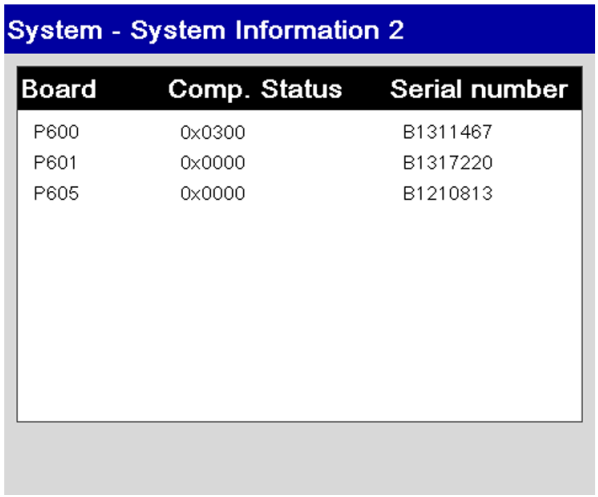



Fig. 12-23 System information 2

### 12.9.4 Submenu item Login

The user can log in to the corpuls1 at various user levels.

To log in a user, proceed as follows:

1. In the menu ***System***, select > ***Login***.
   The input window for entering data is open.


Fig. 12-24 Entering the access code

2. Enter the 4-digit access code.

To obtain the access code for a user level, contact the operator.

By selecting the symbol **<** the user OPERATOR can delete the last entry.

The message ⟨User [XY] logged in successfully⟩ appears. User is logged in.

# 13 Settings Main menu (User level OPERATOR)

This chapter describes the settings for the user level OPERATOR (Person responsible for the device). This chapter follows the structure of the menu of the device.

## 13.1 Menu item Alarms

The menu item ***Alarms*** allows to configure settings for alarms.

### 13.1.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Acoustic alarm signal not audible!

If the surrounding noises are louder than the acoustic alarm signal, the alarm may no longer be heard.

► Always set the minimal volume louder than surrounding noises.

**⚠ WARNING!**

Potential danger with regard to alarm presettings when changing to another area of application!

If the user moves to a application area where other alarm presets are needed, the currently set alarm presets may be inappropriate and result in misinterpretations.

► When changing to another application area, adjust the alarm presets.

### 13.1.2 Submenu item Settings

The submenu item *> **Settings*** allows to configure the suspension of alarms, the reminder signal and the alarm tone silencing function and to change the volume as well as the minimum volume of alarms.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Alarms***, select *> **Settings***.
   The configuration dialogue is open.

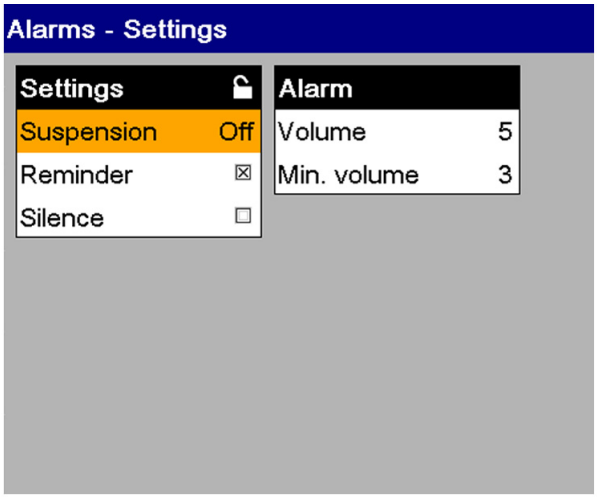



Fig. 13-1 Settings Alarms (user OPERATOR)

List ***Settings***

| List box | Description | Values |
|---|---|---|
| Suspension | Allows to change the duration of the alarm suspension for patient alarms (see 6.8 Alarm suspension on page 53).<br>Selecting the value *Off* allows to disable the suspension of patient alarms altogether, so that the user is not able to suspend alarms.<br>Selecting the value *perm.* allows to enable the suspension of patient alarms permanently, so that the user is able to suspend alarms indefinitely. | Off; perm.;<br>180 s, 120 s, 90 s, 60 s, 30 s |
| Reminder | Allows to enable or disable the reminder signal for existing patient alarms in the following situations: | ☒;<br>☐ |
| Silence | Allows to enable or disable the alarm tone silencing function for existing alarms. | ☒;<br>☐ |

Tab. 13-1 Settings Alarms (user OPERATOR) - List Settings

The user can activate either the function Alarm suspension or Alarm tone silencing, but not both simultaneously.

If the list box *Silence* is selected, the list box *Suspension* is automatically set to the value *Off*.

The settings for the list box Reminder can be configured independently from the settings of the list box *Suspension* and *Silence*.

List ***Alarm***

| List box | Description | Values |
|---|---|---|
| Min. volume | Allows to change the minimal volume of the alarms. | 3 to 10,<br>in increments of one<br>3 = soft<br>10 = loud |

Tab. 13-2 Settings Alarms - List Alarms

The user DEFAULT/MAN. DEFIB. cannot set the volume below the minimal volume.

### 13.1.3 Menu item ECG

The menu item ***ECG*** allows to configure settings for ECG monitoring.

#### 13.1.3.1 Submenu item Filter

The submenu item *> **Filter*** allows to change the frequency for the high pass- and low pass filter.

**⚠ WARNING!**

Wrong ECG filter set!

Can lead to misinterpretation of the ECG.

► ECG filter settings should be changed exclusively by authorised trained personnel.

To open the configuration dialogue, proceed as follows:

1. In the menu ***ECG***, select *> **Filter***.
   The configuration dialogue is open.

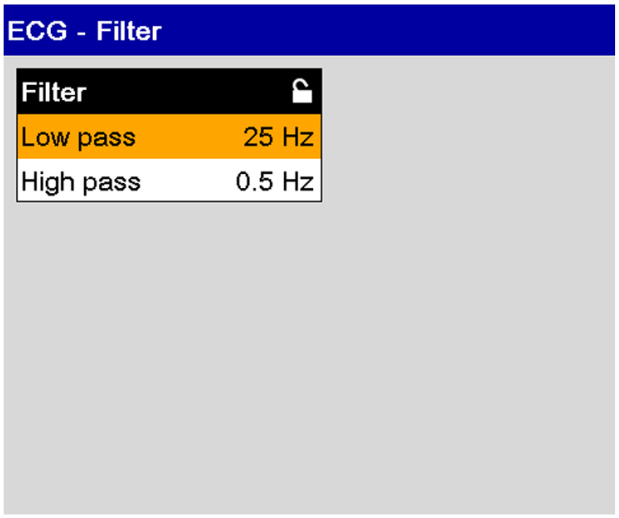



Fig. 13-2 Settings ECG filter (user OPERATOR)

List ***Filter***

| List box | Description | Values |
|---|---|---|
| Low pass | Allows to change the frequency. The low pass filter suppresses interference in the upper frequency range of the ECG curve. | 25 Hz,<br>40 Hz,<br>150 Hz |
| High pass | Allows to change the frequency. The high-pass filter suppresses interference in the lower frequency range of the ECG curve. | 0.05 Hz,<br>0.12 Hz,<br>0.25 Hz,<br>0.5 Hz |

Tab. 13-3 Settings ECG filter (user OPERATOR) - List Filter

The filter settings for the DE lead are pre-configured and fixed at 0.5 Hz to 25 Hz.

## 13.2 Menu item Defib

The menu item ***Defib*** allows to configure settings for the defibrillation mode.

### 13.2.1 Submenu item Metronome

The submenu item *> **Metronome*** allows to change the metronome settings.

- Volume of compression tones and ventilation tones
- Autostart values for ventilation frequency and -duration.
- Ventilation frequency and -duration

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **Metronome***.
   The configuration dialogue is open.

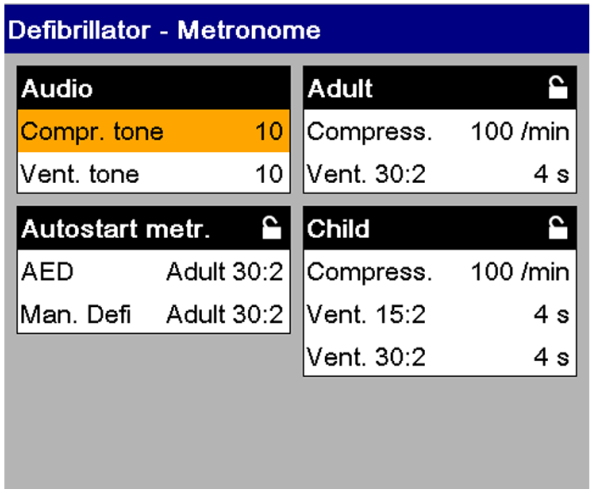



Fig. 13-3 Settings Metronome (user OPERATOR)

List ***Adult***

| List box | Description | Values |
|---|---|---|
| Compress. | Allows to change the frequency for the metronome. | 80 /min to 120 /min, in steps of 5 /min |
| Vent. 30:2 | Allows to change the duration of ventilation for the metronome to mode 30:2. | 3 s to 6 s, in steps of 1 J |

Tab. 13-4 Settings Metronome (user OPERATOR) - List Adult

List ***Child***

| List box | Description | Values |
|---|---|---|
| Compress. | Allows to change the frequency for the metronome. | 80 /min to 140 /min, in steps of 5 /min |
| Vent. 15:2 | Allows to change the duration of ventilation for the metronome to mode 15:2. | 3 s to 6 s, in steps of 1 J |
| Vent. 30:2 | Allows to change the duration of ventilation for the metronome to mode 30:2. | 3 s to 6 s, in steps of 1 J |

Tab. 13-5 Settings Metronome (user OPERATOR) - List child

List ***Autostart metr.***

| List box | Description | Values |
|---|---|---|
| AED | Allows to configure the metronome settings when the AED mode is set as starting mode. | Off; Adult 30:2; Adult cont.; Child 30:2; Child 15:2; Child cont. |
| Man. Defib | Allows to configure the metronome settings when the manual mode is set as starting mode. | Off; Adult 30:2; Adult cont.; Child 30:2; Child 15:2; Child cont. |

Tab. 13-6 Settings Metronome (user OPERATOR) - List Autostart metr.

### 13.2.2 Submenu item Settings

The submenu item *> **Settings*** allows to configure settings for the defibrillation modes.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **Settings***.
   The configuration dialogue is open.

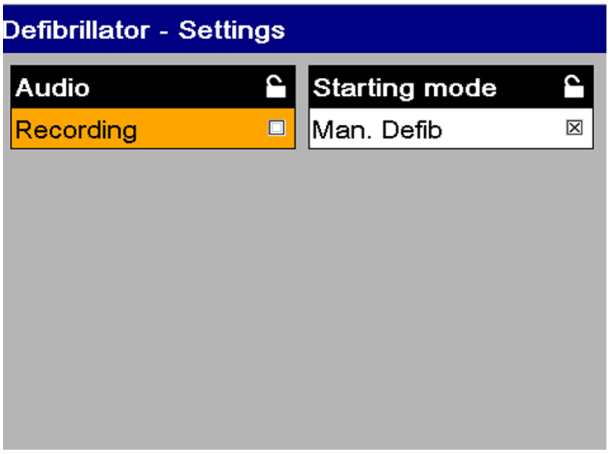



Fig. 13-4 Settings Defibrillator (user OPERATOR)

List ***Audio***

| List box | Description | Values |
|---|---|---|
| Recording | Allows to record the surrounding noises in AED mode and manual mode.<br>NOTE:<br>In manual mode, the recording starts when an energy level higher than zero is set, in AED mode when the **Analyse**. key is pressed. | ☒;<br>☐ |

Tab. 13-7 Settings Defibrillator (user OPERATOR) - List Audio

List ***Starting mode***

| List box | Description | Values |
|---|---|---|
| Man. Defib. | Allows to set a defibrillation mode as default.<br>If the checkbox is selected, the manual mode is enabled first. If the checkbox is deselected, the AED mode is enabled first. | ☒;<br>☐ |

Tab. 13-8 Settings Defibrillator (user OPERATOR) - List Starting mode

### 13.2.3 Submenu item AED

The submenu item *> AED* allows to configure settings for the AED mode.

To open the configuration dialogue, proceed as follows:

1. In the menu *Defib*, select *> AED*.
   The configuration dialogue is open.

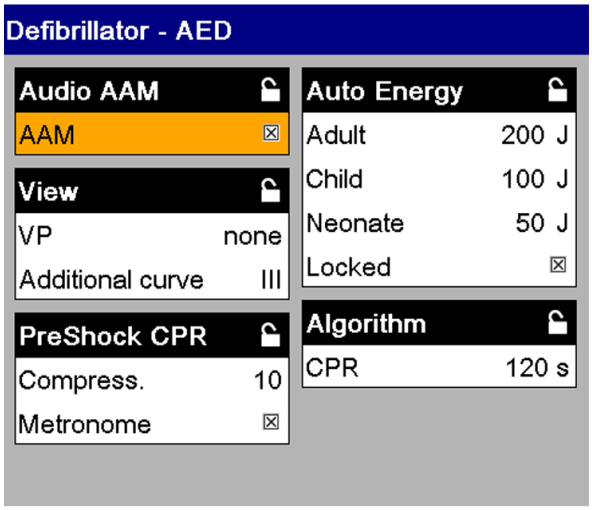



Fig. 13-5 Settings AED mode (user OPERATOR)

List ***Audio AAM***

| List box | Description | Values |
|---|---|---|
| AAM | Allows to disable or enable the audio instructions AAM (Acoustic Advisory Mode) of the resuscitation protocol. | ☒; ☐ |

Tab. 13-9 Settings AED mode (user OPERATOR) - List Audio AAM

List ***View***

| List box | Description | Values |
|---|---|---|
| VP | Allows to display one, two or no vital parameters in AED mode. | none, HR, SpO2, HR/SpO2 CPR rate, SpO2/CPR rate HR/CPR rate NOTE: e. g. HR/SpO2 = HR and SpO2 |
| Additional Curve | Allows to change the second curve in AED mode. | I, II, III, aVR, aVL, aVF, -aVR, Pleth, CPR, DE |

Tab. 13-10 Settings AED mode (user OPERATOR) - List View

List ***preShock CPR***

| List box | Description | Values |
|---|---|---|
| Compress. | Allows to change the number of compressions for preShock CPR measures. | None, 8, 10, 15, 20 |
| Metronome | Allows to enable the metronome for preShock CPR. | ☒; ☐ |

Tab. 13-11 Settings AED mode (user OPERATOR) - List preShock CPR

List ***Algorithm***

| List box | Description | Values |
|---|---|---|
| CPR | Allows to change the duration of CPR measures after a shock release. | 60 s, 90 s, 120 s, 180 s |

Tab. 13-12 Settings AED mode (user OPERATOR) - List Algorithm

List ***Auto Energy***

| List box | Description | Values |
|---|---|---|
| Adult | Allows to configure the energy level that is pre-set for adults when the AED mode is set as starting mode. | 1 J to 200 J, in the pertaining increments for individual steps. |
| Child | Allows to configure the energy level that is pre-set for children when the AED mode is set as starting mode. | 1 J to 100 J, in the pertaining increments for individual steps. |
| Neonate | Allows to configure the energy level that is pre-set for neonates when the AED mode is set as starting mode. | 1 J to 50 J, in the pertaining increments for individual steps. |
| Locked | Allows locking the softkey context menu Energy in AED mode. | ☒; ☐ |

Tab. 13-13 Settings AED mode (user OPERATOR) - List Auto Energy

Entering values for *Auto Energy* can be done in individual steps or with quick pass through (see 12.3.2 Submenu item Limits on page 114).

The Auto Energy settings are only effective after re-starting the corpuls1.

The user OPERATOR can configure the second curve field and one vital parameter field in defibrillation mode.

To configure the second curve field and one vital parameter field, proceed as follows:

1. Press the key **Main menu**.
   The menu has been opened.
2. Navigate to the menu item ***Defib*** > ***AED*** or ***Defib*** > ***Manual*** by pressing the softkey [Up] or [Down].
   The respective menu items are marked in yellow.
3. To select the menu item, press softkey [OK].
   The submenu item is opened.

To close the submenu, press softkey [Back] once or twice.

4. Adjust the settings in the list box *Additional curve* (see 12.4.1 Submenu item Curves on page 118) and *VP* (see 12.4.2 Submenu item Parameters on page 119).
   An additional curve field or vital parameter field are configured.
5. To save the changed settings, the following options are available:
   a) To save the settings, press softkey [Store].
      The menu is closed. The settings will be stored until the user switches off the corpuls1.
   b) To retain the previous settings and close the menu, press the softkey [Cancel].
      The menu is closed. The settings have not been stored.

### 13.2.4 Submenu item Manual

The submenu item > ***Manual*** allows to configure settings for the manual mode.

**WARNING!**

Off ready tone deprives the user of the acoustic knowledge of a shock readiness!

If the ready tone is disabled by the OPERATOR, there is a risk of unintentional shock delivery to the user.

► When disabling the ready tone by the OPERATOR, consider the consequences for the users.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **Manual***.

   The configuration dialogue is open.

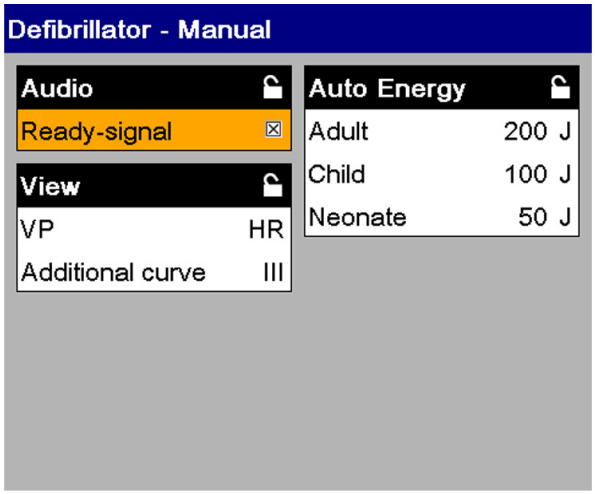



Fig. 13-6 Settings manual mode (user OPERATOR)

List ***View***

| List box | Description | Values |
|---|---|---|
| VP | Allows to display one, two or no vital parameters in AED mode. | none, HR, SpO2,<br>HR/SpO2<br>CPR rate,<br>SpO2/CPR rate<br>HR/CPR rate<br>NOTE:<br>e. g. HR/SpO2 = HR and SpO2 |
| Additional Curve | Allows to change the second curve in AED mode. | I, II, III, aVR, aVL, aVF, -aVR, Pleth, CPR, DE |

Tab. 13-14 Settings manual mode (user OPERATOR) - List View

To configure as user OPERATOR the second curve field and a vital parameter field, proceed as described for submenu item AED (see 13.2.3 Submenu item AED on page 141).

List ***Auto Energy***

| List box | Description | Values |
|---|---|---|
| Adult | Allows to configure the energy level that is pre-set for adults when the manual mode is set as starting mode. | 1 J to 200 J, in the pertaining increments for individual steps. |
| Child | Allows to configure the energy level that is pre-set for children when the manual mode is set as starting mode. | 1 J to 100 J, in the pertaining increments for individual steps. |
| Neonate | Allows to configure the energy level that is pre-set for neonates when the manual mode is set as starting mode. | 1 J to 50 J, in the pertaining increments for individual steps. |

Tab. 13-15 Settings manual mode (user OPERATOR) - List Auto Energy

Entering values for Auto Energy can be done in individual steps or with quick pass through (see 12.3.2 Submenu item Limits on page 114).

The *Auto Energy* settings are valid for the therapy electrodes corPatch easy and shock paddles, but not for shock spoons. For shock spoons, the initial energy level is always 15 J. The user can then increase the shock energy up to 50 J via the softkey context menu Energy.

The Auto Energy settings are only effective after re-starting the corpuls1.

List ***Ready-signal***

| List box | Description | Values |
|---|---|---|
| AAM | Allows to enable or disable the charging tone (ready signal).<br>If the energy for the shock is available, the charging tone (ready signal) is sounding. | ☒;<br>☐ |

Tab. 13-16 Settings manual mode (user OPERATOR) - List Ready-signal

### 13.2.5 Submenu corPatch CPR

The submenu item *> **CPR*** allows to configure settings for the corPatch CPR function.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Defib***, select *> **CPR***.
   The configuration dialogue is open.

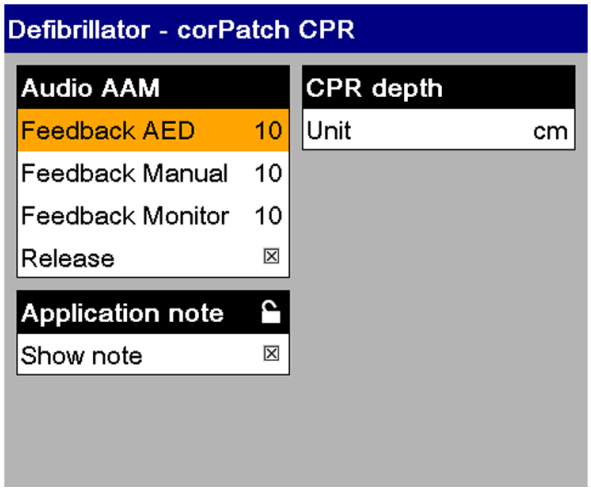



Fig. 13-7 Settings corPatch CPR (user OPERATOR)

List ***Audio AAM***

| List box | Description | Values |
|---|---|---|
| Feedback AED | Allows to change the volume of the speech messages for corPatch CPR feedback in AED mode. | Off; 3 to 10, in increments of one |
| Feedback Manual | Allows to change the volume of the speech messages for corPatch CPR feedback in manual mode. | Off; 3 to 10, in increments of one |
| Feedback Monitor | Allows to change the volume of the speech messages for corPatch CPR feedback in monitoring mode. | Off; 3 to 10, in increments of one |
| Release | Allows to enable or disable the speech messages for corPatch CPR feedback "Push harder" and "Fully release". | ☒; ☐ |

Tab. 13-17 Settings corPatch CPR (user OPERATOR) - List Audio AAM

### 13.2.6 Submenu primeCPR

The submenu *> CPR* allows to configure settings for the primeCPR feedback system..

To open the configuration dialogue, proceed as follows:

1. In the menu *Defib*, select *> CPR*.

   The configuration dialogue opens.

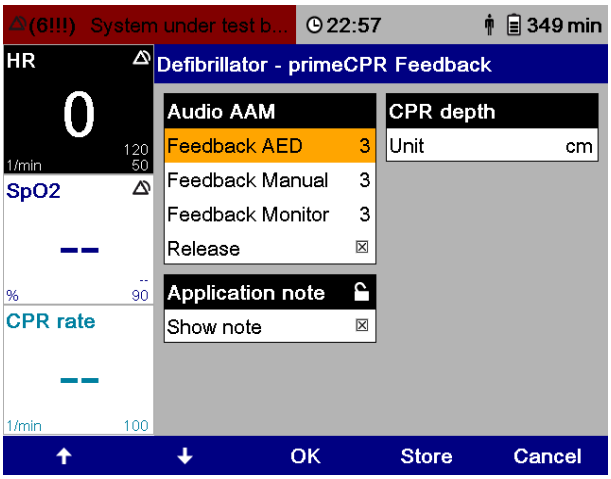



Fig. 13-8 Configuration dialogue primeCPR feedback

The following configuration options for the primeCPR feedback system are available:

List ***Audio AAM***

| List box | Description | Values |
|---|---|---|
| Feedback AED | The volume of the speech messages in AED mode can be adjusted. | Off; 3 to 10, (in increments of one) |
| Feedback Manual | The volume of the speech messages in manual mode can be adjusted. | Off; 3 to 10, (in increments of one) |
| Feedback Monitor | The volume of the speech messages in monitoring mode can be adjusted. | Off; 3 to 10, (in increments of one) |
| Release | The combination of speech messages ⟨Push harder⟩ and ⟨Fully release⟩ can be enabled or disabled. | ☒; ☐ |

Tab. 13-18 Configuration options primeCPR feedback (Operator)

## 13.3 Menu item Pacer (option)

The menu item ***Pacer*** allows to configure settings for the pacer mode.

The menu ***Pacer*** is only available, if the pacer mode has been called up (see 10.8.2 Calling up the Pacer Mode on page 99).

To open the configuration dialogue, proceed as follows:

1. In the main menu, select ***Pacer***.

   The configuration dialogue is open.

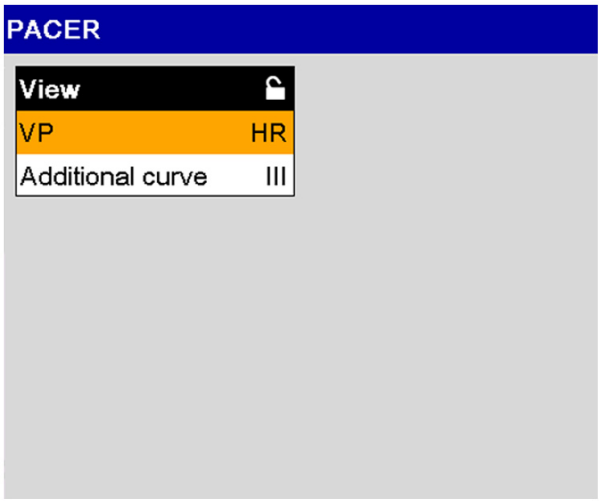



Fig. 13-9 Settings Pacer (user OPERATOR)

List ***View***

| List box | Description | Values |
|---|---|---|
| VP | Allows to show one, two or no vital parameters in pacer mode. | none, HR, SpO2,<br>HR/SpO2<br>CPR rate,<br>SpO2/CPR rate<br>HR/CPR rate<br>NOTE:<br>e. g. HR/SpO2 = HR and SpO2 |
| Additional Curve | Allows to change the second curve in pacer mode. | I, II, III, aVR, aVL, aVF, -aVR, Pleth, CPR, DE |

Tab. 13-19 Settings Pacer - List View

In pacer mode the user OPERATOR can configure the second curve field and a vital parameter field.

To configure the second curve field and one vital parameter field, proceed as follows:

1. Hold down the key/softkey **Main menu** for three seconds.
   The menu has been opened.
2. Navigate to the menu item ***Pacer*** by pressing the softkey [Up] or [Down].
   The menu item is marked in yellow.
3. To select the menu item ***Pacer***, press softkey [OK].
   The submenu item *> **Pacer*** is open.

To close the submenu, press softkey [Back] once or twice.

4. To configure the second curve field and the vital parameter field in the submenu *> **Pacer***, proceed as follows: Select in the list box *Additional curve* and *VP* the required curves or vital parameters (see 12.4.1 Submenu item Curves on page 118) and (see 12.4.2 Submenu item Parameters on page 119).
   An additional curve field or vital parameter field are configured.
5. To save the changed settings, the following options are available:
   a) To save the settings, press softkey [Store].
      The menu is closed. The settings will be stored until the user switches off the corpuls1.
   b) To retain the previous settings and close the menu, press the softkey [Cancel].
      The menu is closed. The settings have not been stored.

## 13.4 Menu item Telemetry

The menu item ***Telemetry*** allows to configure settings for the LAN interface.

### 13.4.1 Submenu item LAN

The submenu item *> **LAN*** allows to adjust settings of the network configuration.

To open the configuration dialogue, proceed as follows:

1. In the menu ***Telemetry*** select ***> LAN***.
   The configuration dialogue is open.
   In the info area at the bottom, the MAC address and the IP address of the corpuls1 are displayed.

If no IP address has been assigned, the corpuls1 shows the IP address 0.0.0.0.

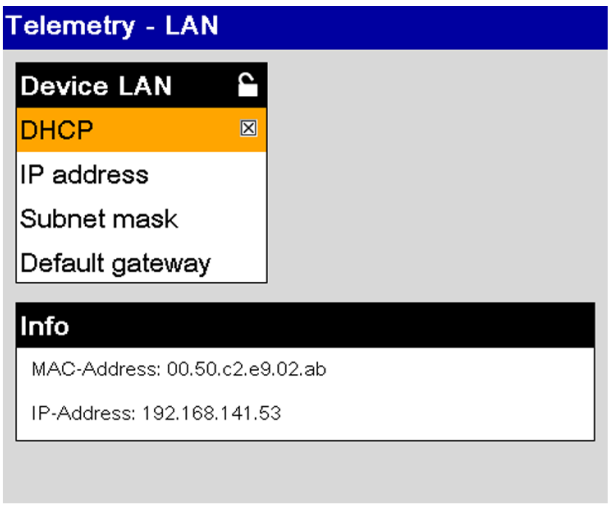



Fig. 13-10 Settings LAN (user OPERATOR)

List ***Device LAN***

| List box | Description | Values |
|---|---|---|
| DHCP | Allows to adjust the type of network configuration.<br>DHCP corresponds to an automatic network configuration. If the automatic network configuration is not enabled, the user OPERATOR has to adjust the network configuration manually. | ☒;<br>☐ |
| IP address | Allows to enter an IP address. | Numbers from 0 to 9;<br>Dot . |
| Subnet mask | Allows to enter a subnet mask. | Numbers from 0 to 9;<br>Dot . |
| Default gateway | Allows to enter a default gateway. | Numbers from 0 to 9;<br>Dot . |

Tab. 13-20 Settings LAN (user OPERATOR) - List Device LAN

If the network configuration has to be adjusted manually, the user OPERATOR has to enter an IP address, a subnet mask and a default gateway. The user OPERATOR can enter the subnet mask and the default gateway analogously.

To change the IP address, proceed as follows:

Prerequisite:

✓ Checkbox at list box *DHCP* is deselected

1. Navigate to the list box *IP address* by pressing the softkey [Up] or [Down].
   The list box is marked in yellow.
2. Press softkey [OK].
   The IP address is visible.

To abort the process, press softkey [Cancel].

3. Press softkey [Change].
   The input window for entering data is open.


Fig. 13-11 Entering the IP address (user OPERATOR)

4. Enter IP address.

Entering values for *IP address* can be done in individual steps or with quick pass through (see 12.3.2 Submenu item Limits on page 114).

   By selecting the symbol < the user OPERATOR can delete the last entry.

5. Press softkey [Store].
   The entry menu is closed. The IP address has been stored and is displayed in the info area at the bottom.

## 13.5 Menu item System

The menu item ***System*** allows to open the mission administration, to configure system settings for the corpuls1, to display system information on the corpuls1, to log in at another user level and to update software/firmware.

### 13.5.1 Submenu item Settings

The submenu item > ***Settings*** allows to configure system settings for the corpuls1.

To open the system settings, proceed as follows:

1. In the menu ***System***, select > ***Settings***.
   The configuration dialogue is open.

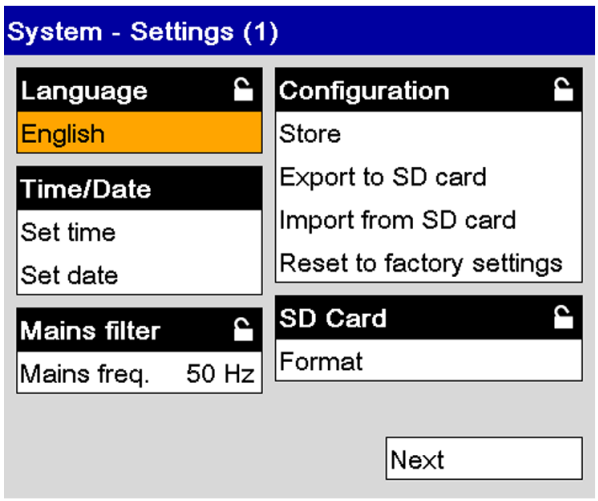



Fig. 13-12 System settings (1) (user OPERATOR)

List ***Language***

| List box | Description | Values |
|---|---|---|
| Depending on the configured language | Allows to select the language of the user interface.<br>The selection of available languages depends on which language pack is installed on the corpuls1. | e. g. English, German |

Tab. 13-21 System settings (1) (user OPERATOR) - List Language

List ***Mains filter***

| List box | Description | Values |
|---|---|---|
| Mains freq. | Allows to adjust the frequency of the mains filter. | 50 Hz, 60 Hz |

Tab. 13-22 System settings (1) (user OPERATOR) - List Mains filter

List ***Configuration***

| List box | Description | Values |
|---|---|---|
| Store | Allows to store the all settings permanently. | |
| Export to SD card | Allows to export the all settings to the SD card.<br>Excepted from export are the access codes for the user levels as well as the device-ID in the master data (in configuration dialogue System - Master data). The user OPERATOR can import the exported settings again or can transfer these to another corpuls1 via the import function. | |
| Import from SD card | Allows to import settings from an SD card onto the device.<br>To import the settings, press the softkey [OK] when the list box *Import from SD card* is marked in yellow. After the message ⟨Import from SD card successful⟩ has disappeared, press softkey [Store] and switch off the corpuls1. The next time the user DEFAULT or MAN. DEFIB. switches on the corpuls1, the imported settings are active. | |
| Reset to factory settings | Allows to reset the corpuls1 to factory settings .<br>When the corpuls1 is reset to factory settings, all mission data that are not archived on the SD card will be deleted, except the data set of the current mission. The corpuls1 informs the user OPERATOR with the alarm ✦Deleting unarchived mission data✦. | |

Tab. 13-23 Settings LAN (user OPERATOR) - List Configuration

To store the complete configuration as set by the user OPERATOR, proceed as follows:

1. In the configuration dialogue ***System - Settings (1)***, select in the list ***Configuration*** the list box> ***Store***.
2. Press softkey [OK].

   The message ⟨Configuration stored⟩ appears.

   All settings configured by the user OPERATOR have been stored and are available for the next start of the device.

List ***SD card***

| List box | Description | Values |
|---|---|---|
| Format | Allows to format the SD card. | |

Tab. 13-24 Settings AED mode (user OPERATOR) - List SD card

The list box *Next* allows to navigate to System settings (2).

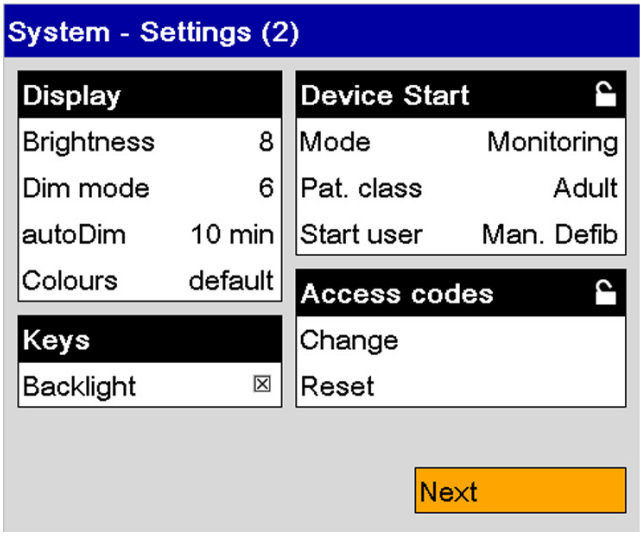



Fig. 13-13 System settings (2) (user OPERATOR)

For a description of the settings of the lists *Display* and *Keys* see the relevant chapter for the user levels DEFAULT or MAN. DEFIB. (see 12.9.2 Submenu item Settings on page 131).

List ***Device start***

| List box | Description | Values |
|---|---|---|
| Mode | Allows to change the starting mode with which the corpuls1 is booting. *Monitoring*: The corpuls1 starts in monitoring mode. *Defib*: The corpuls1 starts in AED- or manual mode, depending on which defibrillation mode is configured (see 13.2.2 Submenu item Settings on page 140).<br>NOTE:<br>Starting in manual mode is only possible if user level *MAN. DEFIB.* is set as start user (*Start user*), because for user level *DEFAULT*, only the AED mode is intended. | Monitoring, Defib |
| Patient class | Allows to change the patient class/-group with which the corpuls1 is booting. | Adult, Child, Neonate |
| Start user | Allows to change the user level with which the corpuls1 is booting. | Default, Man. Defib. |

Tab. 13-25 System settings (2) (user OPERATOR) - List Device Start

List ***Access codes***

| List box | Description | Values |
|---|---|---|
| Change | Allows to change the access codes for the user levels. | DEFAULT, MAN. DEFIB., OPERATOR |
| Reset | Allows to reset the access codes for the user levels to factory settings. | DEFAULT, MAN. DEFIB., OPERATOR |

Tab. 13-26 System settings (2) (user OPERATOR) - List Access codes

### 13.5.2 Submenu item Update

The submenu item *> **Update*** allows the user OPERATOR to install software/firmware updates for the corpuls1. The software/firmware updates come from the manufacturer. They do not entail changes in user guidance or device behaviour.

Make sure that the update procedure will not be interrupted due to low battery charge. Make sure that the battery in the corpuls1 is adequately charged before starting the update procedure. The battery is adequately charged if the message ✦Battery low✦ is not displayed. Alternatively, connect the device to the mains power.

To update the software/firmware, proceed as follows:

Prerequisite:

- ✓ User is logged in as user OPERATOR
- ✓ An SD card with a valid update package is inserted to the corpuls1
- ✓ The update package has to have a defined file name (Example: *C1_2.0.X.pck*)
- ✓ The user OPERATOR has checked that the battery is adequately charged

1. In the menu ***System***, select *>* ***Update***.
   The update dialogue is open.
   The corpuls1 is searching for an installable software package on the SD card.
   The following user interface appears.

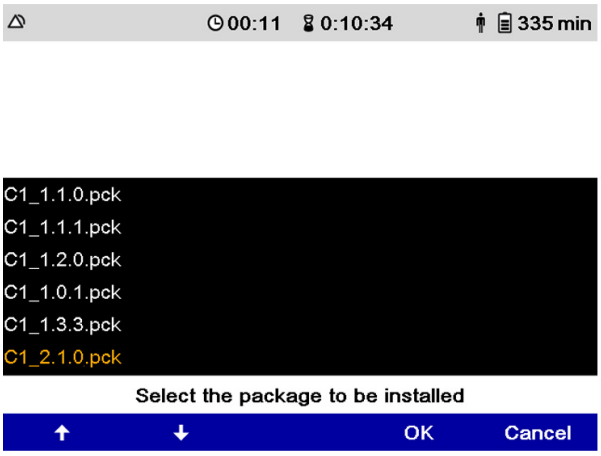



Fig. 13-14 Update - Select the package to be installed (user OPERATOR)

   The message ⟨Select the package to be installed⟩ appears.

2. Navigate to the required software package using the softkeys [Up] and [Down].
   The system lists all software packages that are stored on the SD card and the user has to select.

3. To select the required software package, press softkey [OK].
   The system checks the version of the selected update package and the version of the installed software and shows both versions.
   The following user interface appears.
   The system shows the content of the currently installed package in the column *Current* and content of the selected package in the column *Update*.
   The versions of the currently installed software and of the update package to be installed may only differ in the last (third) number. The version of the update package to be installed has to be higher than that of the currently installed software. The versions of the other four entries (firmware) may

not be lower than the currently installed software. These may also differ in the first and second number. The software package has to be complete. If one of these conditions is not met, the corpuls1 refuses to install the package.

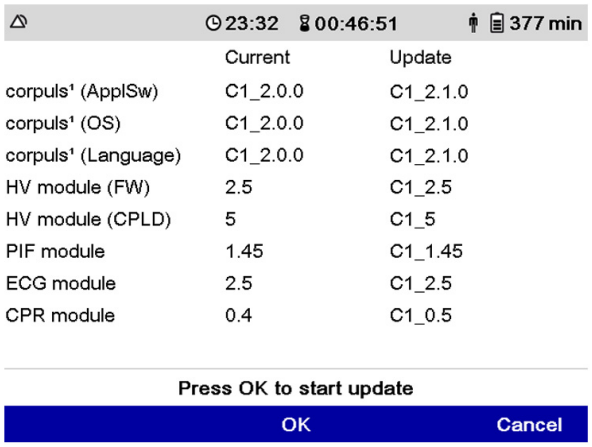



Fig. 13-15 Update - selected file (user OPERATOR)

The message ⟨Press OK to start update⟩ appears.

If the user does not want to install this package, pressing the softkey [Cancel] goes back one step and another package can be selected.

If the user presses the softkey [OK], the system checks once again the installation rights.

If the version number of the update package is older than the version installed, the corpuls1 aborts the update and the message ⟨Update failed, check current software versions⟩ appears.

4. If the correct update package has been selected, press the softkey [OK].

   Messages, as e. g. ⟨Unpacking modules...⟩, ⟨Suspending module operation...⟩ and ⟨Update in progress...⟩ appear.

   The corpuls1 indicates the progress of installing the individual software/firmware files. Successfully installed software/firmware components are represented by a green bar, the progress of software/firmware to be installed by a red bar.

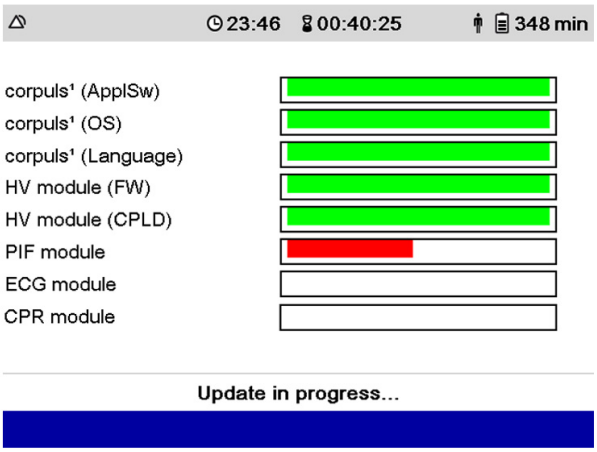



Fig. 13-16 Update - Installation progress (user OPERATOR)

   The message ⟨Rebooting system...⟩ appears, followed by other messages, as e. g. ⟨Collecting data...⟩.

   After a successful update installation the corpuls1 represents all software/firmware components by at green bar.

Do not abort this procedure, the user has to wait until the complete software/firmware package has been written on the corpuls1. If not, the respective module is not functional due to partially overwritten firmware and lack of backup.

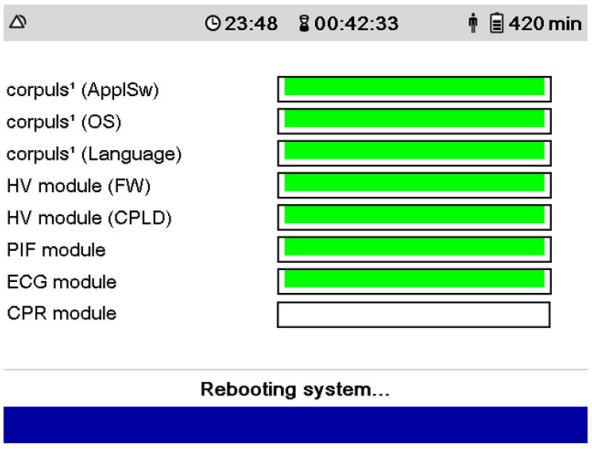



Fig. 13-17 Update - Successful installation (user OPERATOR)

If the update installation is not successful, all faultily installed software/firmware components are represented by a red bar.

The user OPERATOR has to start again the update with the softkey [Again]. The user is again at step 2 (Selection of the software/firmware package to be installed). Repeat all steps, until all installed software/firmware components are represented by a green bar.

If the corpuls1 could not install the software/firmware components correctly, contact your authorised sales and service partner.

   The corpuls1 restarts and the following user interface appears.

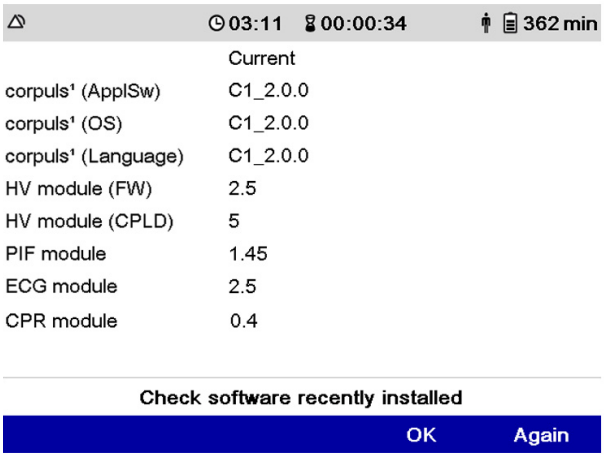



Fig. 13-18 Update - Displaying current software/firmware version (user OPERATOR)

The message ⟨Check software recently installed⟩ appears.

5. After checking the software/firmware version, press softkey [OK].

If the corpuls1 could not start the new software version properly, the corpuls1 starts with the previous software version.

Start normal operation by pressing the softkey [OK].

The message ⟨Restore previous user settings?⟩ appears.

6. One of the two following options are available:
   a) To restore the previous user settings, press softkey [Yes].
      Following the update by the user OPERATOR, the corpuls1 restores the previous customised settings.
   b) To **not** restore previous user settings, press softkey [No].
      Following the update by the user OPERATOR, the corpuls1 returns to factory settings.

Among the previous user settings are also the access codes for the user levels DEFAULT, MAN. DEFIB. and OPERATOR.

The message ⟨Please wait...⟩ appears.

The message ⟨Update completed, rebooting system...⟩ appears.

The corpuls1 starts again in pre-configured startup mode.

The software/firmware update is complete and the start screen (in general the monitoring mode) appears.

If the corpuls1 could not complete the software/firmware update correctly, contact your authorised sales and service partner.

7. Check the functionality of the corpuls1 by means of the daily functional test (see 14.3 Functional Test on page 163).
8. Make sure that the corpuls1 has restored previous user settings.

### 13.5.3 Submenu item Service

The user can set dates for the following service points:

- Next technical safety check (STK)
- Next maintenance
- Next battery change

When the set dates are reached, the user gets a corresponding service note (see 15 Service Events on page 174) when switching off the corpuls1.

When setting the dates, mind the intervals for technical safety checks, maintenance etc. (see 14.2 Checking and maintenance intervals on page 162).

To enter service dates, proceed as follows:

1. In the menu ***System***, select > ***Service***.
   The configuration dialogue is open.
   The list box *Next technical safety check* is marked in yellow.

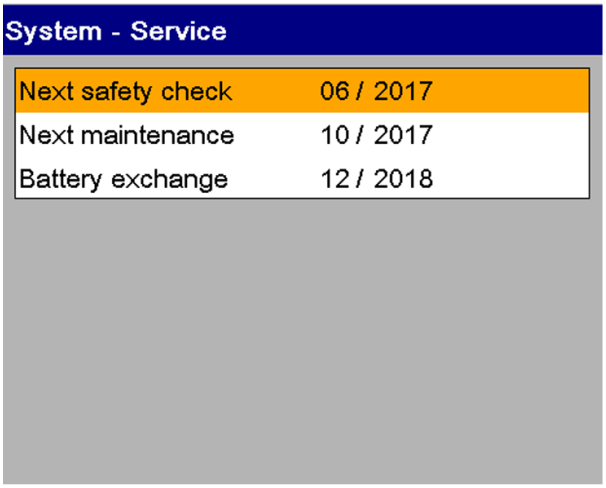



Fig. 13-19 Service entry (user OPERATOR only)

2. Press softkey [OK].
   The list box Next technical safety check is marked in yellow.
3. Enter month value.
   Navigate to the required value by pressing the softkey [Up] or [Down] and confirm with softkey [OK].

The user can navigate to the required value by using individual steps or the quick pass through (see 12.3.2 Submenu item Limits on page 114).

   The selected monthly value is set and the year is marked in yellow.
4. Enter year value.
   Navigate to the required value by pressing the softkey [Up] or [Down] and confirm with softkey [OK].
   The selected year value is set and the list box *Next technical safety check* again is marked in yellow.
5. Navigate to the list box *Next maintenance* by pressing the softkey [Down].
   The list box *Next maintenance* is marked in yellow.
6. For all further service data configurations, proceed as described in steps 3 to 5.
7. Save all entered service data configurations with the softkey [Save] in ***System-Settings (1)*** (see 13.5.1 Submenu item Settings on page 150).

For year entries that are in the past, the corpuls1 marks the value in red.

List ***Service***

| List box | Description | Values |
|---|---|---|
| Next tech. safety check | Date of the next technical safety check | Month (M) and year (Y), in format MM/YYYY |
| Next maintenance | Date of the next maintenance. | Month (M) and year (Y), in format MM/YYYY |
| Battery exchange | Date of the next battery change | Month (M) and year (Y), in format MM/YYYY |

Tab. 13-27 Service entries (user OPERATOR) - List service

### 13.5.4 Submenu item Login

The user OPERATOR can log in to the corpuls1 at various user levels.

**⚠ WARNING!**

Missing access code for manual defibrillation mode!

Can prevent the treatment of patients with an implanted pacer in AED mode.

► Make sure that the access code for the manual mode is made available to authorised users.

The following table gives an overview of the user levels, the access codes set as default and the authorisation levels.

| User level | Access code | Authorisation |
|---|---|---|
| DEFAULT | 1111 | Allows to change the settings for the user level DEFAULT. No access to the manual defibrillation mode. |
| MAN. DEFIB. | 2222 | Allows to change the settings for the user level MAN. DEFIB. Access to the manual defibrillation mode. |
| OPERATOR | 3333 | Allows to change the settings for the user level DEFAULT, MAN. DEFIB. and OPERATOR. Access to the manual defibrillation mode. |

Tab. 13-28 Access codes for the user levels

The operator should change the access code for the user level OPERATOR before handing out the devices to users. So the operator keeps control over all access codes.

To log in a user, proceed as follows:

1. In the menu ***System***, select *> **Login***.
   The input window for entering data is open.


Fig. 13-20 Entering the access code

2. Enter the 4-digit access code.

To obtain the access code for a user level, contact the operator.

By selecting the symbol **<** the user OPERATOR can delete the last entry.

The message ⟨User [XY] logged in successfully⟩ appears. User is logged in.

### 13.5.5 Submenu item Mission

Demo mode

The user OPERATOR can activate the demo mode for training purposes. The demo mode shows simulated curves and vital parameters, the derivations of therapy electrodes (ECG lead DE and vital parameter HR) shows measured values. The demo mode allows a demonstration of all functions and possible configurations. In the defibrillation modes the analysis function (only AED mode) and shock release is active, in pacer mode stimulation current release is active.

**⚠ WARNING!**

Electric shock when used in demo mode!

Can lead to the following side effects in patients, users and third parties: arrhythmias, ventricular fibrillation or asystole.

- ► Take all countermeasures as described in the safety notes pertaining to therapy in defibrillation mode and pacer mode.
- ► The use of the demo mode during patient care is strictly forbidden.
- ► Only use the demo mode for training purposes.
- ► If the corpuls1 is currently in demo mode and should be used for patient care, the device has to be restarted first.

To enable the demo mode, proceed as follows:

1. In the menu ***System***, select *> **Mission***.
   The mission administration is open and allows to enable the demo mode.

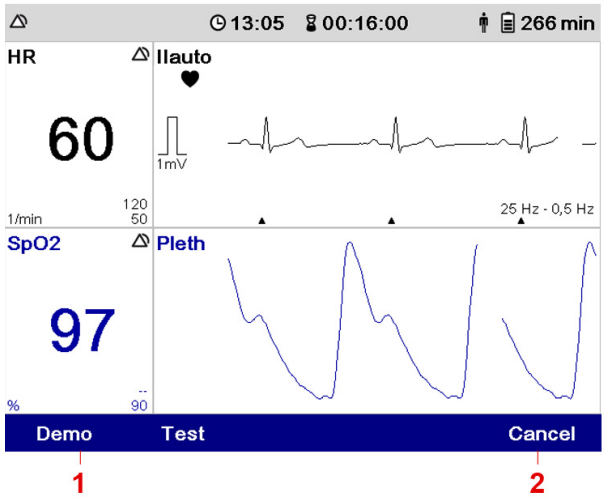



Fig. 13-21 Activating the demo mode

1 Softkey [Demo]
2 Softkey [Cancel]

To close the mission administration, press softkey [Cancel].

2. Press softkey [Demo].
   The confirmation prompt ⟨Start demo mode?⟩ appears.

3. Press softkey [OK].
   The message ⟨Demo mode on⟩ appears in the message line.
   The corpuls1 shows curves and parameters from the internal memory.

To leave the demo mode, press softkey [Cancel].

To disable the demo mode, switch off the corpuls1 with the **On/Off** key.

# 14 Functional Test and Maintenance

The regular function check and maintenance of the corpuls1 guarantees unlimited functional readiness, prevents electrical or mechanical malfunctions and indicates errors promptly.

## 14.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

⚠ WARNING!

Malfunctions of the device!

Can result in functions of the corpuls1 no longer working properly.

- ► If users cannot eliminate malfunctions by themselves, contact an authorised sales and service partner.
- ► If necessary, stop using the corpuls1.

⚠ WARNING!

Device not ready for operation due to no function test and no maintenance!

Can result in functions of the corpuls1 no longer working properly.

- ► Always follow the schedule for function test (see 14.2 Checking and maintenance intervals on page 162) and maintenance, regardless of whether the corpuls1 is only used rarely or is stored for long periods.
- ► Do not use the corpuls1 if a scheduled maintenance (see 14.5 Regular Maintenance Work on page 168) has not been performed.
- ► Make sure that function checks, services and regular inspections are always performed according to schedule.
- ► The corpuls1 and the battery must be stored only under approved storage conditions. Temperature and humidity are very important. See the "Technical data" for the applicable values (see VIII Technical Specifications on page 212).
- ► The storage requirements for therapy electrodes as e. g. corPatch easy and sensors as e.g. the corPatch CPR disposable sensor are described on the packaging of these accessories.
- ► If necessary, stop using the corpuls1.
- ► Regarding electromagnetic interference, no maintenance is required during the life of the device.

⚠ WARNING!

Electric shock!

A damaged connecting cable of the **Testbox** (P/N 04310) or of the**corpuls simulator** (P/N 04311) can lead to the following side effects in patients, users and third parties: arrhythmias, ventricular fibrillation or asystole.

- ► Before using the **Testbox** or the **corpuls simulator** the connecting cable has to be checked for damage.
- ► If there is damage of the connection cable, the **Testbox** or the **corpuls simulator** may not be used under any circumstances.

## 14.2 Checking and maintenance intervals

The following table gives an overview of the intervals at which to perform checks and maintenance measures.

| Measure | Daily/per shift * | After use ** | As re-quired ** | Monthly | Every 2 years | If faulty |
|---|---|---|---|---|---|---|
| Visual check | x | x | x | | | x |
| Basic functional test | x | x | x | | | x |
| Extended functional test | | x | x | x | | x |
| Cleaning/Disinfection | | x | x | | | |
| Shock paddle | x | | x | x | | |
| Technical Safety Check (STK) | | | | | x | x |

Tab. 14-1 Checking and maintenance intervals

Including first commissioning

**Manufacturer's recommendation

## 14.3 Functional Test

The function test checks the functions of the corpuls1.

The function test of the corpuls1 includes visual inspection of the exterior for any deficiencies and checks that all components are complete and also performs a function test of the corpuls1.

The function check of the power supply informs the user about the current state of charge of the batteries.

The function test of the accessories and consumable materials ensures that all materials that the user of the corpuls1 requires are present and functional.

If no correct result is achieved on performing the function checks, read the explanations and measures given for alarms and messages (see 16 Alarms and Messages on page 176).

The function check of the corpuls1 consists of:

- Visual check
- Basic functional test
- Extended functional test

For the daily visual check and the daily functional test a checklist is available (see XII Checklist Functional test on page 243).

**Visual check**

With the visual check of the corpuls1 and its accessories mind the following:

| Presence and serviceability of | Measure | Correct result |
|---|---|---|
| Check corPatch easy electrodes incl. therapy master cable (if present). | a) Inspect therapy master cable for damage.<br>b) Check the expiry date of the corPatch easy electrodes.<br>c) Check the package of the corPatch easy electrodes for damage<br>d) Check if additional corPatch easy electrodes are present as replacement. | Therapy master cable is present and undamaged.<br>Expiry date of corPatch easy electrodes not passed<br>The package of the corPatch easy electrodes is not damaged<br>Additional therapy electrodes are present. |

Tab. 14-2 Visual check corpuls1

| Presence and serviceability of | Measure | Correct result |
|---|---|---|
| Check the device visually for damage. | a) Check the device visually for damage.<br>b) Check the accessories visually for damage. | No damage to the device and its accessories |
| Check shock paddles and therapy master cable (if present) | a) Inspect therapy master cable for damage<br>b) Press the shock paddle buttons a few times to ensure perfect functionality | Therapy master cable is present and undamaged<br>The shock paddle buttons generate an audible confirmation tone |
| Check baby shock electrodes (if present) | a) Check baby shock electrodes for cleanliness and damage | Baby shock electrodes are clean and undamaged |
| Electrode gel for defibrillation (when using shock paddles) | a) Estimate if the quantity of electrode gel is sufficient for the next mission | Sufficient electrode gel for the next mission incl. replacement tube is present |
| Check shock spoons (if present) | a) Functional test, as described in the Shock spoon manual (P/N: 04137) | See Shock spoon manual (P/N: 04137). |
| Pulse oximetry sensors incl. intermediate cable (if present). | a) Check intermediate cable for damage<br>b) Pulse oximetry sensors for damage. | Oximetry intermediate cable and oximetry sensors are present and undamaged. |
| Check ECG electrodes and ECG monitoring cable. | a) Check ECG monitoring cable for damage<br>b) Check ECG electrodes for damage<br>c) A sufficient amount of ECG electrodes is present.<br>d) Check the expiry date of the ECG electrodes | ECG electrodes and ECG monitoring cable are present and undamaged.<br>The ECG adhesive electrodes are not dried out.<br>Sufficient ECG adhesive electrodes are present for the next mission.<br>The expiry date of the ECG adhesive electrodes has not passed. |
| Check CPR Feedback sensors incl. intermediate cable (if present). | a) Check intermediate cable for damage<br>b) Check the expiry date.<br>c) Check the packaging for damage.<br>d) Check if additional sensors are present as replacement. | Intermediate cable is undamaged.<br>Expiry date not passed<br>The packaging is intact.<br>Additional sensors are present. |
| SD Card | a) Check if an SD card is inserted in the corpuls1. | SD card is inserted in the corpuls1. |
| Check **Testbox** (P/N 04310) or **corpuls simulator** (P/N 04311). | a) Check the cable of the **Testbox** or the **corpuls simulator** for damage. | Cable of the **Testbox** or the **corpuls simulator** is not damaged. |

Tab. 14-3 Visual check corpuls1

**Basic functional test**

The daily basic functional check consists of the following steps:

| Purpose | Measure | Correct result |
|---|---|---|
| | | |

| Switch on the corpuls1. | | |
|---|---|---|
| Start functional test | Press the **On/Off** key. | The start logo appears. |

| Self test switch on | | |
|---|---|---|
| Selftest System components | None. | The screen is illuminated. |
| | | The screen displays curves and vital parameter fields. |
| | | The screen displays the remaining running time or the charging status of the battery. The battery is sufficiently charged. |
| | | The alarm history shows no alarms. |

| Check shock paddles and therapy master cable (if present). | | |
|---|---|---|
| Check shock paddles and therapy master cable for functionality. | a) Press the shock paddle buttons a few times to ensure perfect functionality. | The shock paddle buttons generate an audible confirmation tone. |
| | b) Deliver a shock (see functional test Defibrillator/ Pacer) | No error message appears. |

| Defibrillator/pacer | | |
|---|---|---|
| Check the defibrillator/pacer functionality. | Use functional **Testload** (P/N 04312)/**Testbox** (P/N 04310)/ **corpuls simulator** (P/N 04311). For commissioning and decommissioning of the **Testload**/ **Testbox**/ **corpuls simulator** see the user manual **Testload**/ **Testbox**/ **corpuls simulator**.<br>NOTE: For safety reasons, the **corpuls simulator** shows the DE lead in pacer mode and therefore is only partially suitable for the simulation of pacer therapy.<br>a) Select the manual mode of the corpuls1.<br>b) Select a shock energy of 200 J (recommendation of manufacturer: 50 J) and charge.<br>c) Releasing a shock. | The corpuls1 recognises patient impedance correctly. |
| | | The corpuls1 does not signal any error messages. |
| | | |

| Power supply | | |
|---|---|---|
| Check the charging status of the battery. | a) Connect the corpuls1 to a power supply. | Charging status of the battery > 30 %. |
| | b) Checking the charging status of the battery. | At temperatures below the freezing point, the battery charging status has to be > 50 %. |

| | | |
|---|---|---|
| Switch off the corpuls1. | | |
| Conclude the functional test. | Switch off the corpuls1. | The corpuls1 is switched off. |

**Extended functional test**

The extended monthly functional check consists of the following steps:

| Purpose | Measure | Correct result |
|---|---|---|
| | | |
| Switch on the corpuls1. | | |
| Start the functional test. | See Basic functional test | See Basic functional test |
| Self test switch on | | |
| Checking system components. | See Basic functional test | See Basic functional test |
| Check shock paddles and therapy master cable (if present). | | |
| Check shock paddles and therapy master cable for functionality. | See Basic functional test | See Basic functional test |
| Defibrillator/pacer | | |
| Check the defibrillator/pacer functionality. | See Basic functional test | See Basic functional test |
| ECG monitoring | | |
| Check ECG monitoring functionality and ECG monitoring cable. | Use functional **Testbox** (P/N 04310) or **corpuls simulator** (P/N 04311). For commissioning and decommissioning of the **Testbox** or the **corpuls simulator** see the user manual **Testbox/corpuls simulator**.<br>a) For optimal results, select an amplification of x0.5.<br>b) If a ECG curve is not displayed, check the configuration. If necessary, select the vital parameter or curve field in which the value should be shown. | Curve fields and vital parameter fields display the ECG and vital parameters continuously and without artifacts. |

| Pulse Oximetry Monitoring | | |
|---|---|---|
| Check pulse oximetry monitoring functionality and pulse oximetry sensor. | a) Attach the pulse oximetry sensor with the intermediate cable to the patient.<br>b) If the oximetry values PR, PI, SPO2, SPCO, SpHb, SpMet or the plethysmogram are not displayed, check the configuration. If necessary, select the parameter or curve field in which the value should be shown. | Curve fields and vital parameter fields display the plethysmogramme and vital parameters continuously and without artifacts. |

| CPR Feedback Monitoring | | |
|---|---|---|
| Check function of CPR Feedback sensors. | a) Select manual mode.<br>b) Connect the CPR Feedback sensor to the device<br>c) Move the CPR Feedback sensor up and down, approx. at compression rate.<br>d) If the CPR rate or -curve is not displayed, check the configuration. If necessary, select the parameter or curve field in which the value should be shown. | Curve fields and vital parameter fields display the CPR curve and the CPR rate continuously and without artifacts. |

| Power supply | | |
|---|---|---|
| Check SD card. | Check if the SD card is inserted. | SD card is inserted. |

| Alarm system | | |
|---|---|---|
| Check visual and auditory alarm signals for functionality. | a) Connects sensors for the vital parameter to be checked.<br>b) Change upper or lower alarm limits to provoke an alarm. | Visual and auditory alarm signals are issued. |

| Switch off the corpuls1. | | |
|---|---|---|
| Conclude the functional test. | See Basic functional test | See Basic functional test |

## 14.4 Selftest

The corpuls1 performs a functional test in different operating states.

### 14.4.1 Self test switch on

When the user switches on the corpuls1, the corpuls1 performs a self-test switch on. The self-test switch on checks the battery and the internal memory as well as further system components.

If errors occur, the alarm history shows these errors.

### 14.4.2 Automatic Selftest

When the corpuls1 is switched off, the corpuls1 performs an automatic self-test. The automatic self-test checks at regular intervals the battery and the internal memory.

If no errors occur, the LED Operating status flashes up green at regular intervals. If errors occur, the LED Operating status is off. When the user switches on the corpuls1, the alarm history shows these errors.

## 14.5 Regular Maintenance Work

Maintenance works are to be performed exclusively by authorised sales and service partners. Maintenance work performed by non-authorised sales and service personnel can result in damage to the corpuls1 and loss of warranty claims at GS Elektromedizinische Geräte G. Stemple GmbH.

### 14.5.1 Technical Safety Check

The intervals of the technical safety checks can be found in the overview Checking and maintenance intervals. Pursuant to MPBetreibV (German ordinance for operators of medical devices), operators have to make sure that technical safety checks are performed regularly on their devices. In countries outside Germany, the corresponding nationally applicable laws have to be observed.

### 14.5.2 Repair and Service

To avoid transport damage when shipping the corpuls1, use the original packaging. If the original packaging is no longer available, use appropriate packaging. The packaging has to guarantee safe transport of the corpuls1. A packaging instruction is available from the manufacturer upon request.

**⚠ WARNING!**

Electric shock due to defibrillation!

Can lead to arrhythmias, ventricular fibrillation or asystole.

- ► Read the information on using the corpuls1 in the user manual.
- ► Do not open the corpuls1.
- ► If a defect of the corpuls1 is suspected, contact authorised sales and service partner.

## 14.6 Cleaning and Disinfection

Regular cleaning and disinfection allows the user to hygienically prepare the corpuls1 and its accessories for the next use.

Before commissioning the device and after every application or use, all used components must be cleaned and disinfected. The respective accepted standards of hygiene for handling and disinfecting equipment contaminated with bodily fluids must be observed. The locally valid regulations for disposal of infectious waste and material contaminated with bodily fluids must be observed.

The following instructions have been validated by the manufacturer. The operator/person performing reprocessing is responsible for achieving the required result. This necessitates validation and routine supervision of the reprocessing process. Parallel to this validation and supervision, mind differing reprocessing instructions as well.

Checklist:

- Clean or disinfect the defibrillator and the accessories until all visible dirt has been removed.
- Check if all visible dirt has been removed.
- Exclusively clean and disinfect components that are intended to be re-used (device and accessories).
- After cleaning or disinfection, check the functionality of the defibrillator with the accessories.

### 14.6.1 Recommended Cleaning- and Disinfecting Agents

The following disinfectants of PAUL HARTMANN AG (Bode Chemie) have been tested by the manufacturer and are recommended for effectiveness and material compatibility:

| Disinfectants | Active ingredients | CAS No. | Max. application concentration % (m/m) |
|---|---|---|---|
| **Mikrobac® Virucidal Tissues** | Quaternary ammonium compounds | 7173-51-5 | 0.25 |
| | | 68391-01-5 | 0.25 |
| | Aminoalcohols | 141-43-5 | 1 |
| **Bacillol® Sensitive 30** | Alcohols | 71-23-8 | 10 |
| | | 67-63-0 | 20 |
| | | 64-17-5 | 20 |
| | Surfactant | 139734-65-9 | 0.25 |
| **Dismozon® plus** | Peroxide | 84665-66-7 | 100 |
| | Fatty alcohol | 69011-36-5 | 2.5 |
| | Amine | 308062-28-4 | 2.5 |
| **Kohrsolin® FF** | Aldehyde | 111-30-8 | 10 |
| | Surfactants | 69011-36-5 | 10 |
| | | 68439-50-9 | 10 |
| | Quaternary ammonium compounds | 7173-51-5 | 5 |
| | | 68391-01-5 | 5 |
| | Alcohol | 67-63-0 | 13 |
| **Mikrobac® Forte** | Quaternary ammonium compound | 68391-01-5 | 20 |
| | Amine | 2372-82-9 | 5 |
| | Surfactants | 69011-36-5 | 3 |
| | | 68439-50-9 | 2.5 |

Tab. 14-4 Overview of recommended disinfectants

When using other disinfectants, make sure those belong to the same group of active substances.

### 14.6.2 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Electric shock during cleaning and disinfection!

Can lead to arrhythmias, ventricular fibrillation or asystole.

► Switch off and disconnect from power the corpuls1 supply before cleaning the corpuls1.

NOTICE

Wrong cleaning and disinfection!

Can damage the material of the corpuls1 and accessories, impair their functions or cancel out the cleaning/disinfecting effect of substances.

- ► To remove all residue of cleaning- or disinfecting agents, wipe down with clear water the device after the contact time of the cleaning- or disinfecting agent has passed. Make sure the disinfection substance stays on the surface for the specified contact time according to the manufacturer's instructions.
- ► To remove dirt or stains use clean cloths or soft brushes exclusively.
- ► Only use cleaning- and disinfecting agents recommended by the manufacturer or other cleaning and disinfecting agents with equivalent substance groups, to avoid damage and impaired function. Read the application instructions of the manufacturer of the cleaning and disinfecting agents.
- ► Do not mix different cleaning or disinfecting liquids, because there can be interactions between the substances that cancel out their effects. Rinse with clear water between the application of different cleaning or disinfecting liquids.
- ► Follow instructions from the manufacturer of the cleaning and disinfecting agents that vary from this instruction.
- ► corpuls1 and only surface-treat accessories. Do not immerse into cleaning or disinfection fluid.
- ► Do not let fluids penetrate into the plug connections.
- ► corpuls1 and do not clean, disinfect or sterilise accessories by machine.

### 14.6.3 Cleaning and Disinfecting the Device

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the corpuls1, proceed as follows:

Prerequisite:

- ✓ The corpuls1 is disconnected from power supply
- ✓ Cables are disconnected from the corpuls1

1. Wipe surfaces with appropriate cleaning agent and allow to dry.
2. Disinfect surfaces with a suitable disinfectant.
3. Allow disinfected surfaces to dry.
4. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

If the two MagCode female/male metal contacts in the contact field are oxidised (black), the corpuls1 can no longer be charged with the power supply. Clean the contact fields of the MagCode connectors (at the charging brackets, the AC adapter cable or at the DC connector cable) with a glass fibre brush.

### 14.6.4 Cleaning and Disinfecting Charging Brackets (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the charging bracket, proceed as follows:

Prerequisite:

- ✓ The charging bracket is disconnected from the power supply
- ✓ Mains cable is disconnected from charging bracket

1. Wipe surfaces with appropriate cleaning agent and allow to dry.
2. Clean the mains cable with soap solution.

3. Let surfaces and plug connections dry.
4. Disinfect the mains cable with an appropriate disinfectant.
5. Allow disinfected surfaces to dry.
6. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.5 Cleaning and Disinfecting the Pulse Oximetry Sensor (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the pulse oximetry sensor, proceed as follows:

1. Clean the pulse oximetry intermediate cable with soap solution.
2. Let surfaces and plug connections dry.
3. Disinfect the pulse oximetry sensor with an appropriate disinfection substance.
4. Allow disinfected surfaces to dry.
5. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.6 Cleaning and disinfecting the ECG monitoring cable (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the ECG monitoring cable, proceed as follows:

1. Clean the ECG monitoring cable with soap solution.
2. Let surfaces and plug connections dry.
3. Disinfect the ECG monitoring cable with an appropriate disinfection substance.
4. Allow disinfected surfaces to dry.
5. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.7 Cleaning and Disinfecting the Accessory Bags and Frontcover (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the accessory bags and the front cover, proceed as follows:

1. Remove dirt with a brush.
2. Wipe down plastics surfaces.
3. Let surfaces dry.
4. Disinfect the cables with an appropriate disinfection substance.
5. Allow disinfected surfaces to dry.
6. If necessary, treat the zippers with dry-film lubricant (silicone spray).
7. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.8 Cleaning and Disinfecting Shock Paddles (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the shock paddles, proceed as follows:

1. Clean the cable, the shock spoon holders and the electrode surface with soap solution consisting of a cleaning agent (ph value 7 to 8) and clean tap water (drinking quality). Dampen a clean, lint-free cloth with soap solution and thoroughly wipe the device. In case there are grooves, gaps and other geometrical shapes, ball up, fold, or twist the dampened cloth to fit or press the cloth in with your fingernail.

Make sure that no residual electrode gel remains on the electrode plates or between the electrode plates and the paddle handles.

Make sure that the electrode surface is not scratched.

2. Let surfaces and plug connections air dry completely.

Take care that no moisture enters the plug connections.

Take care that the plug connections are dried completely and the contact springs are clean.

3. Disinfect the electrode plates of the shock paddles with an appropriate disinfectant.
4. Allow disinfected surfaces to dry.
5. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.9 Cleaning and Disinfecting Baby Shock Electrodes (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the baby shock electrodes, proceed as follows:

1. Clean the cable and the electrode surfaces with soap solution.
2. Let surfaces and plug connections dry.

Make sure that no residual electrode gel remains.

Make sure that the electrode surface is not scratched.

3. keep contact springs clean.
4. Disinfect the electrode plates of the baby shock electrodes with an appropriate disinfectant.
5. Allow disinfected surfaces to dry.
6. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.10 Cleaning and disinfecting the therapy master cable (Accessories)

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the therapy master cable, proceed as follows:

1. Clean the therapy master cable with soap solution.
2. Let surfaces and plug connections dry.
3. Disinfect the therapy master cable with an appropriate disinfectant.
4. Allow disinfected surfaces to dry.

5. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

### 14.6.11 Cleaning and Disinfecting the CPR Intermediate Cable

Cleaning and disinfection of the corpuls1 is recommended after use and according to need.

To clean and disinfect the corPatch CPR intermediate cable, proceed as follows:

1. Clean the CPR intermediate cable with soap solution.
2. Let surfaces and plug connections dry.
3. Disinfect the CPR intermediate cable with an appropriate disinfection substance.
4. Allow disinfected surfaces to dry.
5. To remove any disinfectant residues, wipe the corpuls1 with a soft cloth soaked in clean water and then allow to dry.

# 15 Service Events

The corpuls1 reminds the user of service events that the user or a service technician have to remedy. The user has to confirm these service events when switching off the corpuls1.

The following table describes service events, their causes and measures to take.

Service events can have different causes. Different causes are labelled with letters in the "Cause" column.

The user can remedy service events by taking specific measures. Different measures are labelled with letters in the "Measure" column. The user must carry out the measures one by one from A to Z until one of the measures proves successful in remedying the service event.

| Service Event | Cause | Measure |
|---|---|---|
| ⟨Planned battery change due⟩<br>NOTE:<br>(see 13.5.3 Submenu item Service on page 157) | a) Battery capacity < 50 %. | a) Change battery and dispose of old battery. |
| ⟨Service checkup due⟩<br>NOTE:<br>(see 13.5.3 Submenu item Service on page 157) | a) Service checkup is due. | a) Contact your authorised sales and service partner. |
| ⟨Safety checkup due⟩<br>NOTE:<br>(see 13.5.3 Submenu item Service on page 157) | a) Safety checkup is due. | a) Contact your authorised sales and service partner. |
| ⟨Therapy electrode reported error⟩ | a) No original accessories were used.<br>b) Error in the therapy electrode module. | a) Use original accessories.<br>b) Contact your authorised sales and service partner. |
| ⟨Defibrillator reported error⟩ | a) Error in the defibrillator module.<br>NOTE:<br>In corpuls1 devices with the Pacer option this service events means that also the pacer is not available. | a) Remove the therapy electrode from the corpuls1 and re-connect.<br>b) Contact your authorised sales and service partner. |

Tab. 15-1 Service Events

| Service Event | Cause | Measure |
|---|---|---|
| ⟨ECG reported error⟩ | a) Error in the ECG module. | a) Contact your authorised sales and service partner. |
| ⟨ECG-Module not detected⟩ | a) ECG module not available.<br>b) An ECG module is available and there is an error in the ECG module. | a) If no ECG module available, no action required.<br>b) Contact your sales and service partner. |
| ⟨Oxi failure⟩ | a) Error in the pulse oximetry module. | a) Remove the sensor from the corpuls1 and re-connect.<br>b) Contact your authorised sales and service partner. |
| ⟨Error CPR module⟩ | a) Error in the CPR module. | a) Remove the sensor from the corpuls1 and re-connect.<br>b) Contact your authorised sales and service partner. |
| ⟨HV unit selftest error⟩ | a) Error in the HV module or defibrillator module. | a) Contact your authorised sales and service partner. |
| ⟨ECG module selftest error⟩ | a) Error in the ECG module. | a) Contact your authorised sales and service partner. |
| ⟨Oxi sensor or oxi cable near expiration⟩ | a) The oximetry sensor or oximetry cable will soon expire. | a) Replace the oximetry sensor or oximetry cable.<br>b) Contact your authorised sales and service partner. |

Tab. 15-2 Service Events

# 16 Alarms and Messages

Alarms signal malfunctions or abnormal performance of the corpuls1 to the user or inform the user about a critical health condition of the patient.

Messages are either instructions to the user or give the user further information concerning alarms.

## 16.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**⚠ WARNING!**

Not eliminating alarms of high (!!!), medium (!!) and low (!) priority!

If alarms with a high priority are not eliminated, this can lead to death, irreversible or reversible injuries of users, patients or third parties.
If alarms with a medium priority are not eliminated, this can lead to death, irreversible or reversible injuries, minor injuries or discomfort of users, patients or third parties.
If alarms with a low priority are not eliminated, this can lead to reversible injuries, minor injuries or discomfort of users, patients or third parties.

► Eliminate alarms immediately after they are signalled.

If no oximetry (SPO2) vital parameters or no oximetry (SPO2) curve are displayed and the pulse oximetry sensor and all cables are connected correctly, check if the combination of pulse oximetry sensor and intermediate cable are compatible. The pulse oximetry sensor M-LNCS needs a 15-pole intermediate cable.

## 16.2 Alarm List

The following table gives an overview of alarms that can occur during operation.

Alarms can have different causes that are labelled with letters in the *Cause* column.

The user can remedy alarms by taking specific measures. Different measures are labelled with letters in the *Measure* column. The user must carry out the measures one by one from A to Z until one of the measures proves successful in remedying the alarm.

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦Replace battery✦ | System | High | a) Maximum charging status of the charged battery < 50 %. | a) Dispose of the old battery and insert a new battery. |
| ✦No batt. inserted✦ | System | High | a) The battery is not inserted.<br>b) The battery is not inserted correctly. | a) Insert the battery.<br>b) Remove battery and re-insert.<br>c) Insert new battery. |
| ✦Defibrillator alarm (x)✦ | System | High | An alarm occurred in the defibrillator. The "X" is a placeholder for a specified number of the alarm.<br>a) Defibrillator does not function correctly. | a) Do not use defibrillator on patients.<br>b) Contact your authorised sales and service partner. |
| ✦CPR sensor expired✦ | System | Medium | a) The sensor is expired. | a) Replace the sensor with a new one. |
| ✦CPR sensor loose✦ | System | Medium | a) The sensor indicated has come loose from the intermediate cable. | a) Check the sensor and reconnect if necessary. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦CPR failure (1)✦ | System | Medium | a) Internal data processing error (Buffer overflow). | -- |
| ✦CPR cable loose✦ | System | Medium | a) The cable indicated is not connected to the corpuls1. | a) Check the respective cable and reconnect if necessary. |
| ✦Database initialisation error✦ | System | High | a) Initialisation of internal memory failed. | a) Contact your authorised sales and service partner. |
| ✦Def. Oxi adhes. sensor✦ | System | Medium | a) The pulse oximetry adhesive sensor is defective or has expired. | a) Dispose of the old pulse oximetry adhesive sensor and use a new pulse oximetry adhesive sensor. |
| ✦Defective Oxi sensor✦ | System | Medium | a) The pulse oximetry sensor cable is not or not properly connected to the pulse oximetry intermediate cable.<br>b) The pulse oximetry sensor is defective. | a) Disconnect the pulse oximetry sensor cable from the pulse oximetry intermediate cable and connect again.<br>b) If the LED of the pulse oximetry sensor does not flash, the pulse oximetry sensor has to be exchanged. |
| ✦Defective Oxi cable✦ | System | Medium | a) The pulse oximetry intermediate cable is not connected properly to the corpuls1.<br>b) The pulse oximetry intermediate cable is defective. | a) Disconnect the pulse oximetry intermediate cable from the corpuls1 and re-connect.<br>b) If the LED of the pulse oximetry sensor does not flash, the pulse oximetry intermediate cable has to be exchanged. |
| ✦ECG electrode L/LA loose✦<br>✦ECG electrode F/LL loose✦<br>✦ECG electrode R/RA loose✦ | Patient<br>Technical | Medium | a) The clip of the ECG monitoring cable is loose.<br>b) The ECG electrode is not attached to the patient.<br>c) ECG electrode does not have sufficient contact to the patient. | a) Connect the clip of the ECG monitoring cable to ECG electrode.<br>b) Attach ECG electrode to patient.<br>c) Check ECG electrode. |
| ✦ECG cable loose✦ | System | Medium | a) The ECG monitoring cable is not connected to the corpuls1.<br>b) The ECG monitoring cable is not connected correctly to the corpuls1. | a) Connect the ECG monitoring cable to the corpuls1.<br>b) Disconnect the ECG monitoring cable from the corpuls1 and re-connect. |
| ✦ECG cable invalid✦ | System | Medium | a) The used ECG monitoring cable is invalid. | a) Replace ECG monitoring cable. |
| ✦ECG-Module not detected✦ | System | High | a) Communication with the ECG module is not possible. | a) Contact your authorised sales and service partner. |
| ✦Wrong pacing electrodes✦ | System | High | Pacer mode is called up.<br>a) Shock paddles or shock spoons are connected to the corpuls1. | a) Connect corPatch easy electrode |
| ✦Device selftest internal memory failure✦ | System | High | a) An error occurred during the selftest of the device's internal memory. | a) Contact your authorised sales and service partner. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦Error CPR module✦ | System | Medium | a) Check the CPR sensor and the CPR intermediate cable and replace, if necessary. If the alarm message persists, the measuring option mentioned is faulty. | a) Contact your authorised sales and service partner. |
| ✦Error CPR sensor✦ | System | Medium | a) The sensor mentioned is defective and has to be exchanged with a new one. | a) Contact your authorised sales and service partner. |
| ✦Defibrillator failure (x)✦ | System | High | An error occurred in the defibrillator. The "X" is a placeholder for a specified number of the alarm.<br>a) Defibrillator does not function correctly. | a) Do not use defibrillator on patients.<br>b) Contact your authorised sales and service partner. |
| ✦ECG failure (x)✦ | System | High | An error occurred in the ECG module. The "X" is a placeholder for a specified number of the alarm.<br>a) ECG monitoring does not function correctly. | a) Do not use the ECG monitoring function on patients.<br>b) Contact your authorised sales and service partner. |
| ✦Pacer failure✦ | System | High | An error occurred in the defibrillator or pacer.<br>a) The defibrillator or pacer does not function correctly. | a) Do not use defibrillator- or pacer function on patients.<br>b) Contact your authorised sales and service partner. |
| ✦Device overheated, defibrillator is not available✦ | System | High | a) The temperature of the corpuls1 is elevated. The corpuls1 is possibly exposed to too high temperatures. | a) Interrupt the charging process of the battery.<br>b) Let the corpuls1 cool down. |
| ✦Device overheated,device switching off✦ | System | High | a) The temperature of the corpuls1 is elevated. The corpuls1 is possibly exposed to too high temperatures. | a) After the user switches off the corpuls1 and before the corpuls1 is switched on again, leave to cool down. |
| ✦Device temperature high✦ | System | Medium | a) The temperature of the corpuls1 is elevated. The corpuls1 is possibly exposed to too high temperatures. | a) Interrupt the charging process of the battery.<br>b) Let the corpuls1 cool down. |
| ✦Heart rate too high✦ | Patient<br>Technical | High | a) The measured heart rate exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦Heart rate too low✦ | Patient<br>Technical | High | a) The measured heart rate falls below the lower alarm limit. | a) Check the patient's vital signs. |
| ✦Internal memory almost full✦ | System | Low | a) The remaining memory capacity of the device ⩽20 %. | a) Switch off the corpuls1 within approx. 15 min.<br>b) Make sure that an SD card with more than 1 GB free memory is inserted in the corpuls1.<br>c) Switch on the corpuls1 again. The alarm should disappear after max. 10 min. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦No ECG cable (DEMAND)✦ | System | High | The DEMAND mode is called up. The pacer is stimulating in DEMAND mode.<br>a) The 4-pole ECG monitoring cable is not connected to the corpuls1.<br>b) The ECG electrodes are not attached to the patient. | a) Check if the 4-pole ECG monitoring cable is connected correctly to the corpuls1 and reconnect, if necessary (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77).<br>b) Check if the corPatch easy electrodes are correctly attached to the patient and re-attach, if necessary (see 10.6.2 Attaching corPatch easy Electrodes to the Patient on page 83). |
| ✦No Oxi cable✦ | System | Medium | a) The pulse oximetry intermediate cable is not connected to the corpuls1.<br>b) The pulse oximetry intermediate cable is not connected properly to the corpuls1. | a) Connect the pulse oximetry intermediate cable to the corpuls1.<br>b) Disconnect the pulse oximetry intermediate cable from the corpuls1 and re-connect. |
| ✦No Oxi adhesive sensor✦ | System | Medium | a) The pulse oximetry adhesive sensor is defective.<br>b) The pulse oximetry adhesive sensor has expired. | a) Replace pulse oximetry adhesive sensor. |
| ✦No Oxi sensor✦ | System | Medium | a) The pulse oximetry sensor cable is not connected to the pulse oximetry intermediate cable.<br>b) The pulse oximetry sensor cable is not or not properly connected to the pulse oximetry intermediate cable. | a) Connect the pulse oximetry intermediate cable to the pulse oximetry sensor cable.<br>b) Disconnect the pulse oximetry sensor cable from the pulse oximetry intermediate cable and connect again.<br>c) If the LED of the pulse oximetry sensor does not flash, the pulse oximetry sensor has to be exchanged. |
| ✦Battery low✦ | System | High | a) Remaining battery charge <20 %. | a) Charge the battery. |
| ✦Deleting unarchived mission data✦ | System | Low | a) Mission data not yet stored on the SD card have been deleted from the device's internal memory. | -- |
| ✦Low confidence PI✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦Low confidence PR✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |
| ✦Low confidence SpCO✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |
| ✦Low confidence SpHb✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |
| ✦Low confidence SpMet✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |
| ✦Low confidence SpO2✦ | System | Medium | a) The displayed reading may deviate from the actual reading. | a) Make sure that the correct sensor is attached to the patient.<br>b) Check if the sensor works correctly.<br>c) If the sensor is not functioning correctly, exchange sensor. |
| ✦Low perfusion SpCO✦ | Patient<br>Physiological | Medium | a) The measured signal is too weak. | a) Make sure that the patient lies calmly during the measurement.<br>b) Select another measurement site. |
| ✦Low perfusion SpHb✦ | Patient<br>Physiological | Medium | a) The measured signal is too weak. | a) Make sure that the patient lies calmly during the measurement.<br>b) Select another measurement site. |
| ✦Low perfusion SpMet✦ | Patient<br>Physiological | Medium | a) The measured signal is too weak. | a) Make sure that the patient lies calmly during the measurement.<br>b) Select another measurement site. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦ONLY FOR DEVELOPMENT✦ | System | High | a) The software version of the corpuls1 is a beta version. The corpuls1 must exclusively be used for test purposes. | a) Take the corpuls1 out of commission.<br>b) Contact your authorised sales and service partner. |
| ✦ONLY FOR TEST PURPOSE✦ | System | Medium | a) The software version of the corpuls1 is a beta version. The corpuls1 must exclusively be used for test purposes. | a) Take the corpuls1 out of commission.<br>b) Contact your authorised sales and service partner. |
| ✦Oxi failure (1)✦ | System | Medium | An error occurred in the pulse oximetry module.<br>a) The readings are unreliable.<br>b) The readings are invalid. | a) Do not use pulse oximetry measuring option on patients. |
| ✦Oxi failure (2)✦ | System | Medium | An error occurred in the pulse oximetry module.<br>a) The memory is full. | a) Do not use pulse oximetry measuring option on patients. |
| ✦Oxi: Demo tool✦ | System | Medium | a) The pulse oximetry sensor demo tool is connected. | a) Do not use pulse oximetry measuring option on patients. |
| ✦Oxi: Interference✦ | System | Medium | a) Too strong ambient light on pulse oximetry sensor. | a) Remove or reduce light source.<br>b) Protect the pulse oximetry sensor from light by using an ambient shield.<br>c) Attach pulse oximetry sensor at a different measuring site.<br>d) Remove or reduce light source. |
| ✦Oxi: low perfusion✦ | Patient<br>Physiological | Low | a) The measured signal is too weak. | a) Make sure that the patient lies calmly during the measurement.<br>b) Select another measurement site. |
| ✦Oxi: Check connection to c1✦ | System | Medium | a) The pulse oximetry sensor cable is not or not properly connected to the pulse oximetry intermediate cable.<br>b) The pulse oximetry intermediate cable is not connected properly to the corpuls1. | a) Disconnect the pulse oximetry sensor cable from the pulse oximetry intermediate cable and connect again.<br>b) Disconnect the pulse oximetry intermediate cable from the corpuls1 and re-connect. |
| ✦Oxi cable expired✦ | System | Medium | a) The pulse oximetry cable has expired. | a) Replace pulse oximetry cable. |
| ✦Oxi adhes. sensor expired✦ | System | Medium | a) The pulse oximetry cable has expired. | a) Replace pulse oximetry adhesive sensor. |
| ✦Oxi: SpO2 only mode✦ | System | Medium | a) If the calibration of the vital parameters SpCO, SpMet and SpHb is not possible, the corpuls1 switches to SpO2 only mode. | a) To calibrate the pulse oximetry sensors again, disconnect the sensor from the measuring site and re-connect. |
| ✦Oxi sensor expired✦ | System | Medium | a) The pulse oximetry sensor has expired. | a) Replace pulse oximetry sensor. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦Pulse rate too high✦ | Patient<br>Physiological | High | a) The measured peripheral pulse exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦Pulse rate too low✦ | Patient<br>Physiological | High | a) The measured peripheral pulse exceeds the lower alarm limit. | a) Check the patient's vital signs. |
| ✦Pacer high impedance✦ | System | High | a) The patient impedance is too high for the selected intensity of the pacer pulse. Pacer pulses cannot reach the selected intensity. | a) Check if the corPatch easy electrodes are correctly attached to the patient and re-attach, if necessary (see 10.6.2 Attaching corPatch easy Electrodes to the Patient on page 83).<br>b) To allow pacer therapy, select a higher intensity for the pacer pulse (see 10.8.4 Performing Pacer Therapy on page 101). |
| ✦Pacer circuit open✦ | System | High | a) The corPatch easy electrodes are not connected correctly to the corpuls1.<br>b) The corPatch easy electrodes are not attached correctly to the patient. | a) Check if the corPatch easy electrodes are connected correctly to the corpuls1 and reconnect, if necessary (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77).<br>b) Check if the corPatch easy electrodes are correctly attached to the patient and re-attach, if necessary (see 10.6.2 Attaching corPatch easy Electrodes to the Patient on page 83). |
| ✦Pacer short circuit✦ | System | High | a) corPatch easyelectrodes are not placed correctly so that pacer therapy is not possible. | a) Make sure that the corPatch easy are placed with sufficient distance to each other on the patient. |
| ✦SD card almost full✦ | System | Low | a) The memory of the SD card is 80 % full. | a) Transfer the mission data from the SD card to another data carrier.<br>b) Insert an empty SD card. |
| ✦SD card missing✦ | System | Low | a) The SD card is not inserted. | a) Insert the SD card.<br>b) Remove SD card and re-insert. |
| ✦SD card full✦ | System | Low | a) There is no more memory capacity on the SD card. | a) Transfer the mission data from the SD card to another data carrier.<br>b) Insert an empty SD card. |
| ✦SpCO too high✦ | Patient<br>Physiological | Medium | a) The measured SpCO value exceeds the upper alarm limit. | a) Check the patient's vital signs. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦SpCO too low✦ | Patient<br>Physiological | Medium | a) The measured SpCO value exceeds the lower alarm limit. | a) Check the patient's vital signs. |
| ✦SpHb too high✦ | Patient<br>Physiological | Medium | a) The measured SpHb value exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦SpHb too low✦ | Patient<br>Physiological | Medium | a) The measured SpHb value exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦SpMet too high✦ | Patient<br>Physiological | Medium | a) The measured SpCO value exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦SpMet too low✦ | Patient<br>Physiological | Medium | a) The measured SpMet value exceeds the lower alarm limit. | a) Check the patient's vital signs. |
| ✦SpO2 too high✦ | Patient<br>Physiological | Medium | a) The measured SpO2 value exceeds the upper alarm limit. | a) Check the patient's vital signs. |
| ✦SpO2 too low✦ | Patient<br>Physiological | Medium | a) The measured SpO2 value exceeds the lower alarm limit. | a) Check the patient's vital signs. |
| ✦ß-SW - NOT FOR PAT. USE✦ | System | High | a) The software version of the corpuls1 is a beta version. The corpuls1 must exclusively be used for test purposes. | a) Take the corpuls1 out of commission.<br>b) Contact your authorised sales and service partner. |
| ✦Check plug of therapy cable✦ | System | High | a) The therapy electrodes are not connected correctly to the therapy master cable. | a) Connect the therapy electrodes correctly to the therapy master cable.<br>b) Check the plugs of the therapy master cable and therapy electrodes for damage.<br>c) Take the corpuls1 out of commission.<br>d) Contact your authorised sales and service partner. |
| ✦Device temperature sensor failure✦ | System | Medium | a) The temperature sensor is not working properly. The measured values may not be correct. | a) Contact your authorised sales and service partner. |
| ✦Paddle interface error (X)✦ | System | High | An error occurred at the paddle interface. The "X" is a placeholder for a specified number of the alarm.<br>a) The paddle interface does not function correctly.<br>b) The paddle interface is possibly no longer available. | a) Do not use defibrillator on patients.<br>b) Contact your authorised sales and service partner. |

| Alarm text | Type of alarm | Priority | Cause | Measure |
|---|---|---|---|---|
| ✦System under test by remote✦ | System | High | a) The software version of the corpuls1 is a beta version. The corpuls1 must exclusively be used for test purposes. | a) Take the corpuls1 out of commission.<br>b) Contact your authorised sales and service partner. |
| ✦Key permanently pressed✦ | System | High | a) A softkey or a key has been held down for longer than 20 s. | a) Do not hold down softkeys or keys for longer than necessary.<br>b) Contact your authorised sales and service partner. |
| ✦Therapy electrode invalid (x)✦ | System | High | The "X" is a placeholder for a specified number of the alarm.<br>a) The connected therapy electrode is invalid. | a) Replace therapy electrode. |
| ✦Therapy electrode cable defective✦ | System | High | a) Connected therapy electrode cable is defective. | a) Replace therapy electrode. |
| ✦Therapy electrode cable loose✦ | System | High | a) Therapy electrode cable is not connected to the corpuls1.<br>b) Therapy electrode cable is not connected correctly to the corpuls1. | a) Connect the therapy electrode cable to the corpuls1.<br>b) Disconnect the therapy electrode cable from the corpuls1 and re-connect. |
| ✦Therapy electrode cable invalid✦ | System | High | a) Connected therapy electrode cable is invalid. | a) Replace therapy electrode cable. |
| ✦Inval. No Oxi cable✦ | System | Medium | a) The connected pulse oximetry intermediate cable is invalid or defective. | a) Replace pulse oximetry intermediate cable. |
| ✦Invalid Oxi adhes. sensor✦ | System | Medium | a) The pulse oximetry adhesive sensor is invalid or defective. | a) Replace pulse oximetry adhesive sensor. |
| ✦Invalid Oxi sensor✦ | System | Medium | a) The pulse oximetry sensor is invalid or defective. | a) Replace pulse oximetry sensor. |
| ✦Remaining runtime < 10 min✦ | System | High | a) The remaining running time of the battery is just only 10 min. | a) Switch off the corpuls1 so that all mission data can be saved correctly. |
| ✦VT/VF possible✦ | Patient<br>Physiological | High | a) There is possibly an arrhythmia in form of a ventricular fibrillation. | a) Check the patient's vital signs.<br>b) Starting ECG analysis. |
| ✦Time/date invalid✦ | System | Low | a) The configured time is invalid.<br>b) The configured date is invalid. | a) Set correct time and date. |

Tab. 16-1 Alarms

## 16.3 List of Messages

The following table gives an overview of the messages that may occur during operation. Message can be displayed in different places, e.g. in the message line or the status line. The respective place is indicated in the column *Description*.

Messages can either inform the user or prompt the user to take measures.

Messages that inform the user are marked with -- in the column *Measures*.

Messages that prompt the user to take measures are labelled with letters in the column *Measure*. The user must carry out the measures one by one from A to Z until one of the measures proves successful.

| Message test | Description | Measure |
|---|---|---|
| # | Message in the message line indicating an invalid text ID. | a) If the message persists, contact authorised sales and service partners.<br>b) Pay attention to occurring alarms. |
| ⟨Alarm OFF⟩ | Message in the status line that the alarm suspension is activated. | -- |
| ⟨Marked as test mission⟩ | Message that the mission has been marked as test mission. | -- |
| ⟨Mark as test mission?⟩ | Message in the message line. The user can mark this mission as test mission. | a) To mark this mission as test mission confirm the prompt. |
| ⟨Start analysis⟩ | Message in the message line of AED mod to start analysis.<br>The message appears simultaneously to the audio instructions. | a) To start the ECG analysis, press the **Analyse** key. |
| ⟨User [XY] logged in successfully⟩ | Message in the message line indicating that the user log-in has been successful. | -- |
| ⟨Ready for charging⟩ | Message in the message line of defibrillation mode that the user can charge the shock energy. | a) To charge the shock energy, press the Charge key. |
| ⟨Ready for shock⟩ | Message in the message line of defibrillation mode that the user can discharge the shock energy. | a) To deliver the shock, press the Shock key. |
| ⟨Select mode⟩ | User prompt to select a pacer mode after pressing the softkey [Mode]. | a) To prepare pacer therapy, select one of the pacer modes. |
| ⟨Please wait ...⟩ | Message that the corpuls1 is saving data on the SD card. | -- |
| ⟨Please wait ...⟩ | Message in the message line that the software update is running. | -- |
| ⟨Enter code:⟩ | User prompt to enter the access code. | a) To log in to the user level, enter the respective access code. |
| ⟨MAN. DEFIB. code incorrect⟩ | Message that the access code for user level MAN. DEFIB. is not correct. | a) Enter the correct access code for user level MAN. DEFIB. |
| ⟨MAN. DEFIB. code correct⟩ | Message that the access code for user level MAN. DEFIB. is correct. | -- |
| ⟨Code changed⟩ | Confirmation that the user has successfully changed the access code. | -- |
| ⟨Code invalid - Retry?⟩ | Message that the user has entered an invalid access code. | a) To enter the correct access code, repeat. |
| ⟨Reset code?⟩ | Message asking if the access code should be reset to factory settings. | -- |
| ⟨Code mismatch - Retry?⟩ | Message that the entry or repetition of the access code for user level MAN. DEFIB. is not correct. | a) To enter the correct access code, repeat. |
| ⟨Attach corPatch CPR sensor⟩ | Message in defibrillation mode to use and attach the corPatch CPR sensor. | a) Connect corPatch CPR sensor to corpuls1 and attach to patient. |
| ⟨Attach the primeCPR sensor⟩ | Message in defibrillation mode to use and attach the primeCPR sensor. | a) Connect primeCPR sensor to the device and attach to patient. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Collecting data...⟩ | Message in the message line that the corpuls1 is creating a summary of the software update. | -- |
| ⟨Defib device not operational⟩ | Message that the defibrillator is not operational. | a) Do not use defibrillator on patients.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Charging⟩ | The message in defibrillator mode that the corpuls1 is charging the defibrillator. | -- |
| ⟨Good compressions⟩ | The message in the message line of the defibrillator mode that the recommended pressure depth of chest compression has been reached.<br>The message appears simultaneously to the audio instructions. | a) Continue with the depth of the thorax compressions. |
| ⟨Connect ECG electrode⟩ | User prompt to connect the ECG electrodes. | a) To obtain ECG signals, the ECG electrodes have to be connected. |
| ⟨ECG electrode loose⟩ | Message that the ECG electrodes are not connected (properly).<br>The message appears simultaneously to the audio instructions. | a) Check if ECG electrodes are connected.<br>b) Connect ECG cable to the corpuls1.<br>c) Connect ECG cable to the patient. |
| ⟨Connect ECG cable⟩ | User prompt to connect the ECG cable.<br>The message appears simultaneously to the audio instructions. | a) Check if ECG electrodes are connected.<br>b) To obtain ECG signals, the ECG cable has to be connected. |
| ⟨ECG cable connected⟩ | Message that the ECG cable is connected. | -- |
| ⟨Recommended electrode placement⟩ | Message in pacer mode to attach the corPatch easy electrodes to the patient. | a) Connect corPatch easy electrodes to the corpuls1 and attach to patient. |
| ⟨Select energy⟩ | User prompt in defibrillation mode to select the shock energy. | a) To be able to perform a defibrillation (manual mode/AED mode), select the shock energy. |
| ⟨Unpacking modules failed⟩ | Message in the message line that the unpacking of update components has failed. | a) Check if there is an update package on the SD card.<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Export to SD card successful⟩ | Message in monitoring mode that the export to SD card has been successful. | -- |
| ⟨Export to SD card failed⟩ | Message in monitoring mode that the export to SD card has failed. | a) Repeat export to SD card. |
| ⟨Wrong therapy electrodes⟩ | Message that the wrong therapy electrodes are connected.<br>The message appears simultaneously to the audio instructions. | a) To be able to perform a defibrillation, connect the correct therapy electrodes.<br>b) To be able to perform pacer therapy, connect the correct therapy electrodes. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Pacer failure⟩ | Message in the message line of the pacer mode that an error has occurred in the pacer. | a) If the problem persists, contact your authorised sales and service partners. |
| ⟨Failure, shutting down system⟩ | Message in the message line that an error has occurred during the software update and that the corpuls1 is switching off. | a) Switch on the corpuls1.<br>b) Start the update procedure again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Push harder⟩ | Message in defibrillation mode indicating that the recommended depth of the thorax compressions has not been reached.<br>The message appears simultaneously to the audio instructions. | a) Increase depth of compressions until the recommended depth has been reached. |
| ⟨Push harder, fully release⟩ | Message in defibrillation mode indicating that the recommended depth of the thorax compressions has not been reached. If activated, the message to fully release the thorax also appears.<br>The message appears simultaneously to the audio instructions. | a) Increase depth of compressions until the recommended depth has been reached.<br>b) If the message "Fully release" is activated, regularly release the thorax fully. |
| ⟨Formatting SD card successful⟩ | Message in the message line indicating that the formatting of the SD card has been successful. | -- |
| ⟨Formating SD card failed⟩ | Message in the message line indicating that the formatting of the SD card has failed. | a) Repeat the formatting of the SD card. |
| ⟨Select frequency⟩ | User prompt in pacer mode to select a stimulation frequency. | a) To begin pacer therapy, select stimulation frequency. |
| ⟨Defib device calibrating⟩ | The message in defibrillator mode that the defibrillator unit in thecorpuls1 is calibrating. | a) If the problem persists, contact your authorised sales and service partners. |
| ⟨Perform CPR⟩ | User prompt in defibrillation mode to perform cardio-pulmonary resuscitation.<br>The message appears simultaneously to the audio instructions. | a) Perform cardio-pulmonary resuscitation. |
| ⟨Charging not possible⟩ | Message in defibrillation mode that the defibrillator cannot be charged. | a) Due to a technical error or because the temperature of the charging generator has exceeded a limit value, the corpuls1 needs to cool down.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Retrieving packages failed⟩ | Message in the message line that the corpuls1 could not retrieve update packages. | a) Check if there is an update package on the SD card.<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Retrieving package info failed⟩ | Message in the message line that the corpuls1 could not retrieve information about the update package. | a) Check if there is an update package on the SD card.<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Import from SD card successful⟩ | Message that the import from SD card has been successful. | -- |
| ⟨Import from SD card failed⟩ | Message that the import from SD card has failed. | a) Repeat import from SD card.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Switch pacer to FIX mode?⟩ | Confirmation prompt in pacer mode if the device should switch to FIX mode or if pacer therapy should be terminated. Reason:<br>Cause: e. g. ECG monitoring cable removed. | a) To be able to perform pacer therapy in DEMAND mode, connect the ECG monitoring cable.<br>b) If the confirmation prompt persists, check if the device can safely switch to FIX mode.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Select intensity⟩ | User prompt in pacer mode to select a pacing intensity. | a) To begin pacer therapy, select intensity. |
| ⟨Select intensity/frequency⟩ | User prompt in pacer mode to select a pacing intensity and/or -frequency. | a) Select a pacing intensity and/or -frequency. |
| ⟨No ECG cable (DEMAND)⟩ | Message in pacer mode DEMAND that no ECG cable is connected. | a) To be able to perform pacer therapy in DEMAND mode, connect an ECG cable.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Shock not recommended⟩ | The message in the message line in defibrillator mode that the corpuls1 does not recommend a shock.<br>The message appears simultaneously to the audio instructions. | a) Continue with other measures according to the general guidelines. |
| ⟨Package not accessible⟩ | Message in the message line that the corpuls1 could not access the update package. | a) Check if there is an update package on the SD card.<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Package not accessible, retry⟩ | Message in the message line that the update package cannot be accessed. | a) Restart the procedure with the softkey [Again].<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨No packages found⟩ | Message in the message line that the corpuls1 found no update packages on the SD card. | a) Check if there is an update package on the SD card. |
| ⟨No SD card⟩ | Message in update mode that no SD card with update files is inserted. | a) Insert an SD card to the corpuls1.<br>b) If an SD card is inserted, remove and re-insert. |
| ⟨No connection to defibrillator unit⟩ | Message that there is no connection to the defibrillator. | a) Do not use defibrillator on patients.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Configuration stored⟩ | Message that the corpuls1 has stored the settings. | -- |
| ⟨Check software recently installed⟩ | Message in the message line to check the software that has been installed. | a) Accept and confirm the installed software or repeat procedure by pressing the softkey [Again]. |
| ⟨Manual defibrillation mode confirmed⟩ | The message that the corpuls1 has switched to manual defibrillation mode. | -- |
| ⟨Manual defibrillation mode?⟩ | Confirmation prompt in AED mode if the user wants to switch to manual mode. | a) If a switch to manual defibrillation mode is intended, press softkey [OK]. |
| ⟨Suspending module operation...⟩ | Message in update mode that the corpuls1 is suspending operation of modules. | -- |
| ⟨Select modules⟩ | Message in the message line to select and confirm update modules. | a) Select one or more software/firmware modules and confirm. |
| ⟨Unpacking modules...⟩ | Message in update mode that the corpuls1 is unpacking the selected software update components. | -- |
| ⟨Enter new code:⟩ | User prompt to enter a new access code. | a) Enter a new access code. |
| ⟨Re-enter new code:⟩ | User prompt to repeat the new code. | a) Repeat the new code. |
| ⟨New code invalid - Retry?⟩ | User prompt to repeat the new code correctly. | a) Enter the access code again.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Oximetry cable connected⟩ | Message that the oximetry cable is connected. | -- |
| ⟨Package corrupted⟩ | Message in the message line that the update package is unusable or corrupted. | a) Check if there is an update package on the SD card.<br>b) Delete update package from the SD card and copy again.<br>c) Contact your authorised sales and service partner for a new SD card with update package. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Package corrupted, retry⟩ | Message in the message line that the update package is unusable or corrupted. | a) Restart the procedure with the softkey [Again].<br>b) Delete update package from the SD card and copy again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Retrieving package info...⟩ | Message in the message line that the corpuls1 is checking the content of the selected update package. | -- |
| ⟨Do not touch and move patient⟩ | Message in defibrillation mode not to touch the patient.<br>The message appears simultaneously to the audio instructions. | a) When the corpuls1 delivers a shock, there is a possible risk for the user. |
| ⟨Pause⟩ | Message in pacer mode that the corpuls1 has paused pacer therapy. | a) Continue pacer therapy if necessary. |
| ⟨Permanent alarm suspension⟩ | Message that the alarm suspension is permanently active. | -- |
| ⟨Perform preShock CPR⟩ | Message in the message line of AED mode that the corpuls1.has started the preShock CPR phase. | -- |
| ⟨Deliver shock⟩ | Message in defibrillation mode that the user can deliver the shock.<br>The message appears simultaneously to the audio instructions. | a) The user can deliver a shock. |
| ⟨Shock aborted⟩ | Message in defibrillation mode that the corpuls1 has discharged internally. | a) To be able to perform therapy, check the patient's impedance and take appropriate measures (see 10.7.2 Patient impedance on page 88).<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Shock performed⟩ | Message in defibrillation mode that the corpuls1 has delivered the shock.<br>The message appears simultaneously to the audio instructions. | -- |
| ⟨Press shock paddle buttons again⟩ | User prompt in the message line in defibrillation mode to press the shock paddle buttons APEX and STERNUM one or more times. | a) To contact the shock paddle buttons sufficiently, press the shock paddle buttons one or more times.<br>b) If after several presses the message ⟨Check therapy electrodes⟩ appears, proceed as described in this message.<br>c) If the problem persists, contact your authorised sales and service partners. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Hold down Shock key⟩ | User prompt in defibrillation mode to hold down the **Shock** key. | a) To deliver a shock, hold down the **Shock** key until the corpuls1 has delivered the shock. |
| ⟨Pacer high impedance⟩ | Message in pacer mode that the impedance is too high. | a) To be able to perform therapy, check the patient's impedance and take appropriate measures (see 10.7.2 Patient impedance on page 88). |
| ⟨Pacer circuit open⟩ | Message in pacer mode that the pacer circuit is open. | a) The corPatch easy electrodes are not connected correctly to the patient or they have a too high resistance to the patient's skin. Stimulation is not possible.<br>b) Check if the electrodes connected to the patient are positioned and attached properly and not dried out. |
| ⟨Switch off pacer?⟩ | Confirmation prompt in pacer mode if pacer therapy should be terminated in order to switch to manual or AED defibrillation mode. | a) To switch off the pacer, confirm. |
| ⟨Pacer device not operational⟩ | Message that the pacer is not operational. | a) Do not use pacer function on patients.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Connect pacer cable⟩ | User prompt in pacer mode to connect the cable of the therapy electrodes. | a) To be able to perform pacer therapy, connect therapy cable. |
| ⟨Pacer short circuit⟩ | Message in pacer mode that there is a short circuit. | a) To be able to perform pacer therapy, eliminate the short circuit. |
| ⟨Screenshot successful⟩ | Message that the corpuls1 has created a screenshot. | -- |
| ⟨Screenshot failed⟩ | Message that the creation of a screenshot has failed. | a) Repeat screenshot procedure.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Formatting SD card? Mission data will be deleted.⟩ | Confirmation prompt if the SD card should be formatted. Mission data on the SD card will be deleted. | a) The user can confirm this prompt. |
| ⟨Do not remove SD card⟩ | Message that the corpuls1 is shutting down and is copying mission data to the SD card. | a) Do not remove SD card. |
| ⟨Formatting SD card...⟩ | Message that the corpuls1 is formatting the SD card. | a) Do not remove SD card. |
| ⟨Storing configuration failed⟩ | Message that the storage process has failed. | a) Repeat storage process.<br>b) If the problem persists, contact your authorised sales and service partners. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Check plug of therapy cable⟩ | Message in pacer mode to check the therapy cable. | a) Check therapy cable and disconnect and re-connect plug, if necessary.<br>b) If the problem persists, contact your authorised sales and service partners. |
| ⟨Pacing⟩ | Message in pacer mode that pacer therapy is running. | -- |
| ⟨Pause pacing?⟩ | Confirmation prompt in pacer mode if pacer therapy should be paused. | a) The user can confirm this prompt. |
| ⟨Continue pacing?⟩ | Confirmation prompt in pacer mode if pacer therapy should be continued. | a) The user can confirm this prompt. |
| ⟨Searching for service events...⟩ | Message that the corpuls1 is collecting service events during the shut-down procedure. | a) Wait until the corpuls1 has collected all service events. |
| ⟨Searching for update packages...⟩ | Message in the message line that the corpuls1 is searching for update packages on the SD card. | -- |
| ⟨Power off?⟩ | Confirmation prompt if the corpuls1 should be switched off. | a) The user can confirm this prompt. |
| ⟨Shutting down system...⟩ | Message in the message line that the corpuls1 is shutting down. | -- |
| ⟨Rebooting system...⟩ | Message in update mode that the corpuls1 is restarting the device as part of the update procedure. | -- |
| ⟨System shutdown in XXs⟩ | Message that the corpuls1 is shutting down in XX s. | a) Press softkey [Now] to save event data and immediately shut down the corpuls1.<br>b) Press softkey [Cancel] to cancel the shutdown process.<br>The risk, however, is a loss of mission data. |
| ⟨Temporary alarm suspension for [NUMBER] s⟩ | Message that the alarm suspension is temporarily active for [NUMBER] s. | -- |
| ⟨Connect therapy electrodes⟩ | Message to connect the therapy electrodes.<br>The message appears simultaneously to the audio instructions. | a) To be able to perform therapy, connect the therapy electrodes. |
| ⟨Therapy electrodes loose⟩ | Message in defibrillation mode that the therapy electrodes are not connected (properly).<br>The message appears simultaneously to the audio instructions. | a) Check if therapy electrodes are connected.<br>b) Connect therapy electrodes to the corpuls1.<br>c) Attach therapy electrodes to the patient. |
| ⟨Check therapy electrodes⟩ | Message to check the therapy electrodes.<br>The message appears simultaneously to the audio instructions. | a) Check if therapy electrodes are connected.<br>b) If necessary, use new therapy electrodes. |

| Message test | Description | Measure |
|---|---|---|
| ⟨Therapy cable connected, select patient class⟩ | Message in the message line that the therapy cable is connected and the user can select the patient class/-group. | a) Select patient class.<br>b) If the user does not select a patient group, the corpuls1 uses the default patient group for the connected therapy electrodes. |
| ⟨Press OK to start update⟩ | Message in the message line to confirm software update. | a) Press softkey [OK] to start update. |
| ⟨Update failed, check current software versions⟩ | Message in the message line that the software update has failed and prompt to check the currently installed software version. | a) Check the available software/firmware packages on the SD card.<br>b) Restart the procedure with the softkey [Again]. |
| ⟨Update failed, retry⟩ | Message in the message line that the software update has failed. | a) Start the update procedure again.<br>b) Check if there is an update package on the SD card.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Update completed, rebooting system...⟩ | Message in the message line that the corpuls1 has finished the update procedure and is restarting. | -- |
| ⟨Update in progress...⟩ | Message in update mode that the software update is running. | -- |
| ⟨Update manager not available, retry⟩ | Message in the message line. The update manager is not available. | a) The user can confirm this prompt. |
| ⟨Restore previous user settings?⟩ | Confirmation prompt in the message line if the previous user settings should be adopted in the updated software version. | a) The user can confirm this prompt. |
| ⟨Restoring previous user settings failed⟩ | Message in the message line that the corpuls1 could not restore the previous user settings after the software update. | a) Import the user settings via the SD card from another device.<br>b) Configure the corpuls1 again.<br>c) If the problem persists, contact your authorised sales and service partners. |
| ⟨Select the package to be installed⟩ | Message in the message line to select and confirm an update package. | a) Select and confirm an update package. |

Tab. 16-2 Messages

# 17 Charging brackets (Accessories)

The charging bracket (P/N: 05400) and the adapter charging bracket (P/N: 05405) allow to fixate and charge the corpuls1. The technical specifications for the charging bracket and the adapter charging bracket are summarised in the Appendix under Technical specifications (see VIII Technical Specifications on page 212).

The operator has to make sure that the technical safety check of the charging bracket and the adapter charging bracket is performed together with the technical safety check of the corpuls1.

## 17.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**NOTICE**

Use of the charging brackets in open air!

Can lead to damage to charging bracket and the adapter charging bracket or impair their function.

► Use the charging bracket and the adapter charging bracket only inside.

## 17.2 Replacing the Fuse

If the fuse is defective, the user can replace the fuse for the charging bracket and the adapter charging bracket. The fuse holder with the fuse inserted is located at the bottom side of the charging bracket and the adapter charging bracket.

Tools:

- Flat head screwdriver size 1.0 x 5.5 mm
- New fuse, type T6.3AH 5x20 mm (P/N 56060.06300)

To replace the fuse, proceed as follows:

Prerequisite:

✓ The corpuls1 has been removed from the charging bracket

✓ The AC adapter of the charging bracket is disconnected from the power supply

1. Unscrew the fuse holder with a slotted screw driver counterclockwise from the charging bracket.
2. Remove old fuse from the fuse holder.
3. Insert new fuse into fuse holder.
4. Screw the fuse holder with a slotted screwdriver clockwise into the charging bracket.

## 17.3 Installing Charging Brackets

Read the installation instruction (P/N 10002.054001).

## 17.4 Using Charging Brackets

The user can insert the corpuls1 into the charging bracket and remove it from the charging bracket.

### 17.4.1 Inserting the device into the charging bracket

To be able to use the charging bracket, the user has to insert the corpuls1 into the charging bracket.

To insert the corpuls1 into the charging bracket, proceed as follows:

Prerequisite:

✓ The battery is inserted in the corpuls1

✓ The charging bracket is connected to the power supply

1. Lift and tilt the corpuls1.

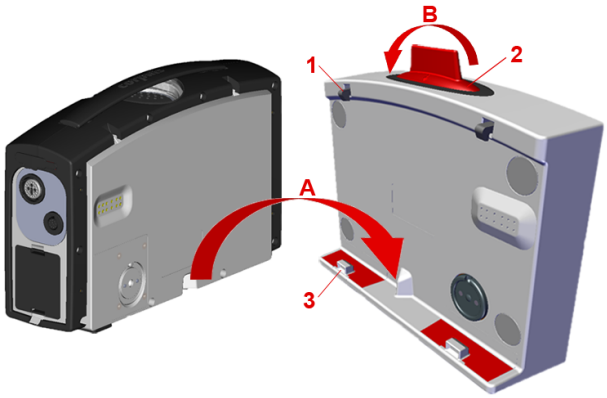



Fig. 17-1 Inserting the device into the charging bracket

1 Latch
2 Unlocking lever
3 Pin

The corpuls1 is slightly tilted forward and its rear side is facing the charging bracket.

2. Insert the corpuls1 into the charging bracket (item A).
   The recesses at the bottom of the device fit onto the pins (item 3).

3. Let the corpuls1 engage in the charging bracket.
   The two latches (item 1) engage perceptibly at the corpuls1.
   The LED Charging status glows orange.

It may take up to 60 s until the LED Battery status is glowing orange.

If no battery is inserted in the corpuls1, the corpuls1 automatically switches on and issues an alarm message that the battery is missing.

### 17.4.2 Removing from the charging bracket

If the charging bracket is no longer needed, the user can remove the corpuls1 from the charging bracket.

To remove the corpuls1 from the charging bracket, proceed as follows:

1. Pull the unlocking lever (item 2) at the charging bracket forward (item B)

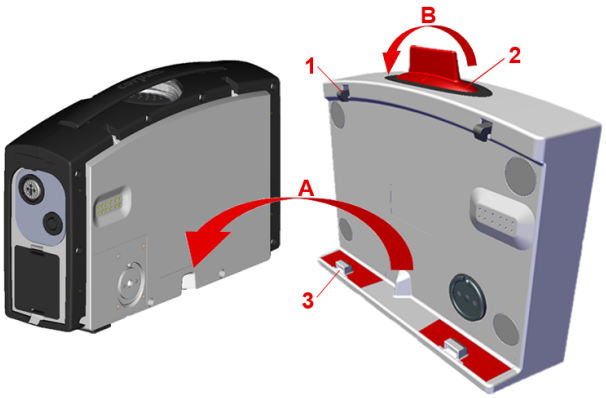



Fig. 17-2 Removing from the charging bracket

1 Latch
2 Unlocking lever
3 Pin

The corpuls1 has been unlocked from the charging bracket.

2. Remove the corpuls1 from the charging bracket.

## 17.5 Using the adapter charging bracket

The user can insert the corpuls1 into the adapter charging bracket and remove it from the adapter charging bracket.

### 17.5.1 Inserting the device into the charging bracket

To be able to use the adapter charging bracket, the user has to insert the corpuls1 into the adapter charging bracket.

To insert the corpuls1 into the adapter charging bracket, proceed as follows:

1. Inserting the adapter charging bracket into the corpuls3 charging bracket.
   The latch at the corpuls3 charging bracket engages and locks completely.
2. Insert the corpuls1 into the adapter charging bracket.
   The LED Charging status glows orange.

It may take up to 60 s until the LED Battery status is glowing orange.

If no battery is inserted in the corpuls1, the corpuls1 automatically switches on and issues an alarm message that the battery is missing.

### 17.5.2 Removing from the charging bracket

If the adapter charging bracket is no longer needed, the user can remove the corpuls1 from the adapter charging bracket.

To remove the corpuls1 from the adapter charging bracket, proceed as follows:

1. Release the latch at the adapter charging bracket.
2. Remove the corpuls1 from the adapter charging bracket.
3. Release the latch at the corpuls3 charging bracket.

4. Remove the adapter charging bracket from the corpuls3 charging bracket.

# 18 Accessory bags with shock paddle holders, fold-out supports and front cover (Accessories)

The left and the right accessory bag allow to safely store the pulse oximetry sensor and the ECG monitoring cable. In addition, the two accessory bags allow to hold the shock paddles. For this purpose shock paddle holders can be attached to the outside of the two accessory bags.

The front cover allows to guide the pulse oximetry sensor cable towards the right accessory bag and to safely store corPatch easy electrodes as well as the CPR Feedback sensor. In addition, the front cover allows to store the therapy master cable for the shock paddles.


Fig. 18-1 corpuls1 with accessory bags and front cover and shock paddle holders

1 Shock paddle holders left
2 Shock paddle holders right
3 Accessory bag right (with zipper)
4 Front cover (with opening tab on top)
5 Accessory bag left (with zipper)

The optional fold-out support on the back allow to prop up the corpuls1 in a stable position.

## 18.1 Warnings

The following warnings inform the user of possible hazards when using the corpuls1.

**NOTICE**

Damaged cables due to bending or coiling!

Can lead to signal failure or cable breaks.

► Always gather the cable in loops.

## 18.2 Packing and fixating the left accessory bag

Store the pulse oximetry sensor cable in the accessory bag.

In the following is described how the user can fixate the accessory bag to the left side of the device and store the pulse oximetry sensor cable in it.

Also described are the following measures:

- Guide the cable and plug of the pulse oximetry sensor through the slot at the bottom of the left accessory bag.
- Guide the cable and plug of the pulse oximetry sensor over both grooves of the front cover through the slot at the bottom of the right accessory bag towards the right side of the device.
- Fixate the front cover.
- Fixate the left fold-out support and the left accessory bag.

When the cable of the pulse oximetry intermediate cable is connected to the corpuls1, remove the plug of the pulse oximetry intermediate cable and the ECG monitoring cable from the corpuls1. This prevents damage to the plugs.

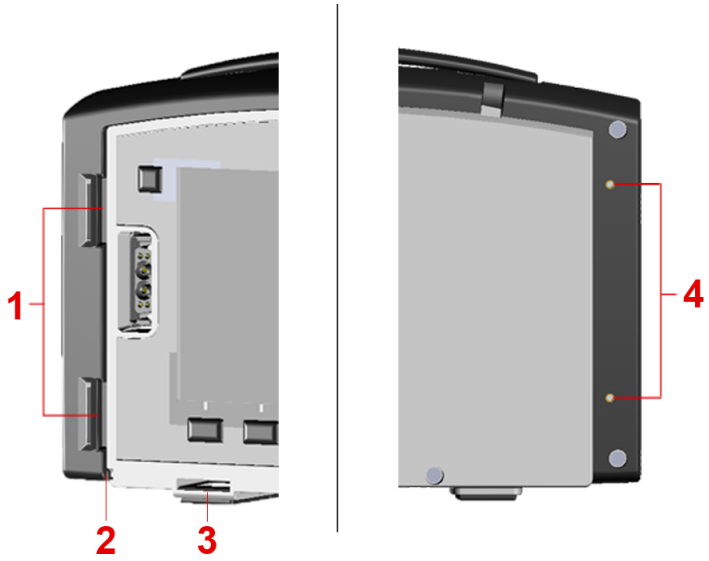



Fig. 18-2 Fixating the accessory bags (Example left side)

1 Recess (front side of the device)
2 Opening for pulse oximetry intermediate cable at the groove at the bottom of the left accessory bag
3 Fastening socket for front cover (front side of device)
4 Screw threads (rear side of device)

Tools needed:

- Torx screw driver size 10

To pack and fixate the right accessory bag and fixate the right fold-out support, proceed as follows:

1. Open the zipper.
2. Insert the pulse oximetry intermediate cable into the groove at the bottom of the left accessory bag.

Guide the pulse oximetry intermediate cable with the plug through the grooves of the softcover. Then guide the cable to the right side of the device. Prepare a sufficient length of cable.

The plug of the pulse oximetry intermediate cable is on the right side of the left accessory bag.

3. Guide both snaplock pins of the front cover towards the fastening sockets (item 3). Insert the pulse oximetry intermediate cable into the groove of the front cover. Push both front cover snaplock pins into the fastening sockets until they engage perceptibly.
4. Fit the hooks of the left accessory bag into both recesses (item 1) at the front side of the device.
   The pulse oximetry intermediate cable is threaded through the groove at the bottom of the left accessory bag (item 2) and inserted in the grooves of the front cover.
5. Push the left accessory bag towards the rear side of the device.
   The holes of the accessory bag fit over the screw threads (item 4) at the rear side.
6. Position the left fold-out support with both fixation holes over the holes of the left accessory bag and the screw threads.
7. Insert the provided screws into the respective screw threads (item 4) with a screw driver.
   The left accessory bag and the left fold-out support are fixated at the device.
8. Connect the pulse oximetry intermediate cable to the pulse oximetry sensor cable and store it in the left accessory bag.

9. Close the zipper.

## 18.3 Packing and fixating the right accessory bag

Store the ECG monitoring cable in the right accessory bag.

In the following is described how the user can fixate the accessory bag to the right side of the device and store the ECG monitoring cable in it.

Also described are the following measures:

- Continue the plug of the pulse oximetry intermediate cable in front of it via the front cover guide grooves and connect to the right side of the device.
- Fixate the right fold-out support and the right accessory bag.
- Connect the plug of the ECG monitoring cable to the right side of the device.

Tools needed:

- Torx screw driver size 10

To pack and fixate the right accessory bag, proceed as follows:

Prerequisite:

✓ Left accessory bag, fold-out support (optional) and front cover are attached at the corpuls1 (see 18.2 Packing and fixating the left accessory bag on page 198).

1. Open the zipper.
2. Guide the pulse oximetry intermediate cable with plug through the groove at the bottom of the right accessory bag.
   The plug of the pulse oximetry intermediate cable is on the right side of the right accessory bag.
3. Guide the CPR Feedback sensor cable (with intermediate cable if appropriate) through the groove at the bottom of the right accessory bag.
   The plug of the CPR Feedback sensor is on the right side of the right accessory bag.
4. Fit the hooks of the right accessory bag into both recesses (item 1) at the front side of the device.
5. Push the right accessory bag towards the rear side of the device.
   The holes of the accessory bag fit over the screw threads (item 4) at the rear side.
6. Position the (optional) right fold-out support with both fixation holes over the holes of the right accessory bag and the screw threads.
7. Insert the provided screws into the respective screw threads (item 4) with a screw driver.
8. Connect the pulse oximetry intermediate cable to the Oximetry interface at the right side of the corpuls1 (see 9.3.2 Pulse oximetry sensor (Accessories) on page 67).
9. Connect the ECG monitoring cable to the ECG-M interface at the right side of the corpuls1 (see 9.3.1 ECG electrodes (accessories) on page 67).
10. Connect the CPR Feedback sensor to the CPR interface at the right side of the corpuls1, 10.4.3 corPatch CPR disposable sensor (Accessories) 10.4.4 Connecting the primeCPR Feedback Sensor (Accessory)
11. Store the ECG monitoring cable in the right accessory bag.
12. Close the zipper.

## 18.4 Pack the front cover

The front cover allows to accommodate corPatch easy electrodes, the CPR Feedback sensor and the therapy master cable for the shock paddles .

To pack the front cover, proceed as follows:

Prerequisite:

✓ Left accessory bag and left fold-out support are fixated at the corpuls1 (see 18.2 Packing and fixating the left accessory bag on page 198)

✓ Right accessory bag and right fold-out support (optional) are attached at the corpuls1 (see 18.3 Packing and fixating the right accessory bag on page 200).

1. Open the front cover with opening tab on top.
2. Connect corPatch easy electrodes to the therapy electrode interface at the front of the corpuls1 (see 4.3.1 Front Side of the Device on page 26).

As an alternative to the corPatch easy electrodes, shock paddles can also be connected (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77). In this case, do not pre-connect the corPatch easy electrodes as described in this step.

3. Store the corPatch easy electrode cable in the front cover bag.
4. Accommodate and connect the CPR Feedback sensor in the front cover 10.4.3 corPatch CPR disposable sensor (Accessories), 10.4.4 Connecting the primeCPR Feedback Sensor (Accessory).
5. Accommodate the therapy master cable for the shock paddles in the front cover bag.
6. Close font cover.

## 18.5 Attaching shock paddles to shock paddle holders on the accessory bags.

The two accessory pockets allow to hold the shock paddles by externally mounted shock paddle holders.

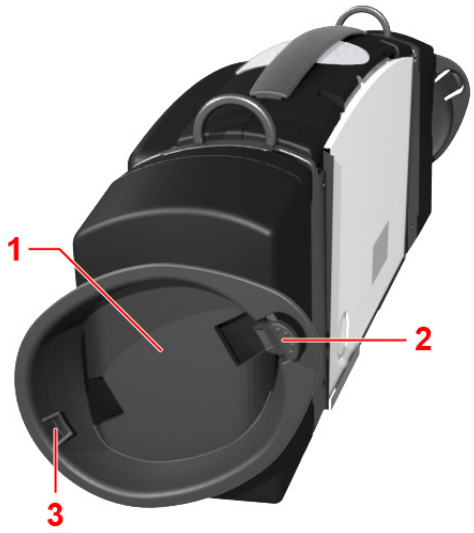



Fig. 18-3 Shock paddle holders on accessory bags for attaching shock paddles

1 Shock paddle holders right (example)
2 Holding nose fixed
3 Holding nose flexible

To pack and fix the shock paddles, proceed as follows:

Prerequisite:

- ✓ Left and right accessory bag and left and right fold-out support (optional) are fixated at the corpuls1 (see 18 Accessory bags with shock paddle holders, fold-out supports and front cover (Accessories) on page 198)
- ✓ Shock paddle holders are attached to left and right accessory pockets (optional) (see VI Approved accessories and consumables on page 210)
- ✓ The front cover is open.

1. Take the therapy master cable out of the front cover.
2. Connect the shock paddles to the therapy socket on the front of the corpuls1 via the therapy master cable (see 10.4.1 corPatch easy Electrodes or Shock Paddles (Accessories) on page 77).
3. Insert the lower side of the shock paddle (left/right) into the fixed lower holding nose (item 3) of the shock paddle holder of the left/right accessory bag until it snaps into place.
4. Insert the shock paddle (left/right) into the flexible upper holding nose (item 2) of the shock paddle holder until it snaps into place.

   Both shock paddles (left and right) are fixed in the shock paddle holders and connected to the corpuls1 via the therapy master cable.

# Appendix

## I List of Abbreviations

| | |
|---|---|
| AAM | Acoustic Advisory Mode |
| Para. | Paragraph |
| AC | Alternating Current |
| AED | Automatic external defibrillator |
| APOD$^{TM}$ | Adaptive Probe Off Detection TM Technology |
| P/N | Product number |
| BF | Body Floating |
| CF | Cardiac Floating |
| CPR | Cardiopulmonary resuscitation |
| DC | Direct Current |
| DHCP | Dynamic Host Configuration Protocol |
| ECG-M | Electrocardiogramme-Monitoring |
| ECG | Electrocardiogramme |
| etc. | Et cetera |
| HR | Heart rate |
| CPR | Cardio-pulmonary resuscitation |
| kgKG | Kilogramme body weight |
| LAN | Local Area Network |
| LED | Light emitting diode |
| MPBetreibV | Medical Devices Operator Ordinance |
| MRI | Magnetic Resonance Imaging |
| n/a | Not available |
| $O_2$ | Oxygen |
| OP | Operation room |
| PC | Personal Computer |
| PI | Perfusion index |
| Pleth | Plethysmogramme |
| Item | Item |
| PR | Peripheral pulse |
| QRS | Indicates a QRS complex in the ECG |
| SFTP | Simple File Transfer Protocol |
| SpCO | Carboxyhaemoglobin levels |
| SpHb | Measurement of total haemoglobin levels |
| SpMetSpMet | Methaemoglobin levels |
| $SpO_2$ | Arterial oxygen saturation |
| STIM | Pacing |
| Tech. safety check | Technical Safety Check |

| | |
|---|---|
| inter alia | Among others |
| and the like | And the like |
| UDP | User Datagram Protocol |
| UMDNS | Universal Medical Device Nomenclature System |
| etc. | And so on |
| VF | Ventricular fibrillation |
| VP | Vital parameters |
| VT | Ventricular tachycardia |
| e.g. | For example |

# II Measuring Units and Operators

Measuring units:

| | |
|---|---|
| % | Percent |
| ° | Degree (angle) |
| °C | Degree Celsius |
| °F | Degree Fahrenheit |
| µA | Microampere |
| µs | Microsecond |
| µV/bit | Microvolt/Bit |
| 1/min | Rate |
| A | Ampere |
| A/m | Ampere/Metre |
| Ah | Ampere hour |
| cm | Centimetre |
| $cm^2$ | Square centimetre |
| dB | Decibel |
| g | Gramme |
| g/dl | Gramme/Decilitre |
| GB | Gigabyte |
| GHz | Gigahertz |
| h | Hour |
| Hz | Hertz |
| in | Inches |
| J | Joule |
| J/kg | Joule/Kilogramme |
| kB | Kilobyte |
| kg | Kilogramme |
| Body weight | Body weight |
| kHz | Kilohertz |
| kV | Kilovolt |
| kΩ | Kilo ohms |
| lb | Pound |
| m | Metre |
| mA | Milliampere |
| MB | Megabyte |
| MHz | Megahertz |
| min | Minute |
| mm | Millimetre |
| mm/s | Millimetres/second |
| mmol/l | Millimol/Litre |
| ms | Millisecond |

| | |
|---|---|
| mV | Millivolt |
| MΩ | Megaohm |
| nA | Nanoampere |
| nm | Nanometer |
| s | Second |
| sq in | Square Inch |
| V | Volt |
| V/m | Volt/metre |
| W | Watt |
| Ω | Ohm |

Operators:

| | |
|---|---|
| < | Smaller than |
| ⩽ | Smaller than or equal to |
| > | Greater than |
| ⩾ | Greater than or equal to |
| ± | Plusminus |

# III Glossary

| Term | |
|---|---|
| Acoustic Advisory Mode | Audio instructions of the resuscitation protocol which support the user in operating the device. |
| Adaptive Probe Off Detection™ Technology | Degree of sensitivity for the adaptive recognition of disconnected pulse oximetry sensors. |
| FastSat® algorithm | The FastSat® algorithm tracks rapid changes in $SpO_2$ saturation during the intubation phase. In case of insufficient signal quality, the corpuls1 disables the function automatically. |
| Medical Devices Operator Ordinance | Ordinance on the installation, operation, usage and maintenance of medical devices. Applicable in the Federal Republic of Germany. |

# IV Warranty

In addition to the statutory warranty conditions, the manufacturer offers a limited warranty on material defects and manufacturing faults. The scope of the warranty can be viewed in the respective guarantee conditions.

This warranty conclusively regulates the legal relationship between the purchaser and the manufacturer. Further damage claims are excluded, unless liability is prescribed by law.

Excepted from the warranty are:

- Wear parts.
- Errors and damages that are the result of
  - Improper handling
  - Faulty storage or installation
  - Extraneous causes, suchas transport damage, damage caused by impact
  - Repair work and changes carried out by a non-authorised third party.

The claim under the warranty shall be void as well if accessories or spare parts are used that were not purchased from the manufacturer or from an authorised sales and service partner. Furthermore, the claim under the warranty shall be void as well if non-authorised accessories are used (see VI Approved accessories and consumables on page 210). Software support (except updates) is not covered under the warranty.

In case the corpuls1 is defective or in case of a warranty and guarantee handling please contact an authorised sales and service partner or the manufacturer. The manufacturer shall only accept liability for user- and operating safety of the corpuls1 if maintenance, technical safety checks, repairs, additions and new settings were performed by the manufacturer or persons specifically authorised by the manufacturer. In addition, the manufacturer's General Terms and Conditions (GTC) apply in the current version until further amendment.

# V Protection Rights and Patents

The pulse oximeter of the Masimo Rainbow® SET technology of the company Masimo XXX is covered under one or more of the following U.S.A. patents: 5,758,644, 6,011,986, 6,699,194, 7,215,986, 7,254,433, 7,530,955. Other applicable patents are listed at: www.masimo.com/patents.htm

Possession or purchase of this Masimo rainbow SET® pulse oximeter does not convey any express or implied license to use the pulse oximeter with unauthorized sensors or cables which would, alone or in combination with this pulse oximeter, fall within the scope of one or more of the patents relating to this pulse oximeter.

It is not permitted to e..g.:

- dismantle parts of the corpuls1 and use them for other purposes.
- Replicate components or accessories.

Goods are mentioned in the user manual without mention of any existing patents, samples or trademarks.

**corpuls®** is a registered trademark of GS Elektromedizinische Geräte G. Stemple GmbH.

GS® GS is a registered trademark of GS Elektromedizinische Geräte G. Stemple GmbH.

# VI Approved accessories and consumables

A list of approved accessories and consumables can be found under :

my.corpuls.world

For further information, advice and sales please contact an authorised service and sales partner.

# VII Disposal

Do not dispose of the corpuls1 or the accessories via the household waste. Please ask your local authorities for information on correct disposal of the corpuls1 and the accessories or return them to the manufacturer.

Dispose of the packaging of the corpuls1 by means of your local institutions e. g. recovered paper container, recycling centre, paper collection etc.

# VIII Technical Specifications

## General technical specifications

| Dimensions | | | |
|---|---|---|---|
| Without accessory bags and frontcover | Height | 17 cm | 6.69 in |
| | Width | 26 cm | 10.24 in |
| | Depth | 7 cm | 2.8 in |
| With accessory bags and frontcover | Height | 17 cm | 6.69 in |
| | Width | 40 cm | 15.75 in |
| | Depth | 13.0 cm | 5.12 in |
| Battery | Height | 4.2 cm | 1.65 in |
| | Width | 4.6 cm | 1.81 in |
| | Depth | 7.6 cm | 2.99 in |

Tab. 8-1 Technical specifications - Dimensions

## Weight

| Weight | | |
|---|---|---|
| Without accessory bags and frontcover | 2300 g | 5.07 lb |
| With accessory bags and frontcover | 3250 g | 7.17 lb |
| Battery | 250 g | 0.56 lb |

Tab. 8-2 Technical Specifications - Weight

## Special specifications

| Special specifications | |
|---|---|
| Vibration- and shock tests | DIN EN1789 |

Tab. 8-3 Technical specifications - Special specifications

| Environmental requirements | | | |
|---|---|---|---|
| Environmental Temperature | Temperature range | | Function |
| | -20 °C to 0 °C | -4 °F to +32 °F | Defibrillator - with battery capacity at >70 % |
| | 0 °C to +55 °C | +32 °F to +131 °F | Defibrillator - no limitations |
| | -20 °C to 0 °C | -4 °F to +32 °F | Pacer, ECG Monitoring, Screen<br>- with battery capacity at >50 % |
| | 0 °C to +55 °C | +32 °F to +131 °F | Pacer, ECG Monitoring, Screen<br>- no limitations |
| | 0 °C to +55 °C | +32 °F to +131 °F | Pulse oximetry |
| | -20 °C to +55 °C | -4 °F to +131 °F | Discharging battery - no limitations |
| | +5 °C to +40 °C | +41 °F to +104 °F | Charging battery - no limitations |
| | +40 °C to +50 °C | +104 °F to +122 °F | Charging battery - with limitations<br>The batteries have an internal protection which could delay or interrupt the charging process at ambient temperatures of higher than 40°C. |
| Transient temperature<br>(Oximetry may fail at temperatures of -20 °C (-4 °F) after approx. 15 min, see Environmental requirements) | -20 °C to +55 °C | -4 °F to +131 °F | |

| Environmental requirements | | | |
|---|---|---|---|
| Warm-up time | 0 min | (Storage temperature -20 °C/-4 °F, ambient temperature +20 °C/+68 °F) | |
| Cool-down time | 10 min | (Storage temperature +65 °C/+149 °F, ambient temperature +20 °C/+68 °F) | |
| Relative humidity | ≤95 % (without condensation) | | |
| Altitude/Atmospheric pressure | Altitude of earth's atmosphere | | Atmospheric pressure |
| | 4518 m to -382 m | 114822.83 ft to -1253.28 ft | 576 hPa to 1060 hPa |
| Protection | IP55 (dust- and splash proof) | | |
| Operating panel | Splash proof keypad | | |

Tab. 8-4 Technical Specifications - Environmental requirements

| Storage temperature | | |
|---|---|---|
| corpuls1 | -40 °C to +70 °C | -4 °F to +149 °F |
| Battery | +10 °C to +30 °C | +50 °F to +86 °F |

Tab. 8-5 Technical Specifications - Storage temperature

| Charging time battery | | |
|---|---|---|
| Maximum storage period for new rechargeable batteries within the specified temperature range | Battery capacity before storage 30 % | Battery in device: 10 days. |
| | | Battery outside of device: 400 days. |
| | Battery capacity before storage 100 % | Battery in device: 38 days. |
| | | Battery outside of device: 550 days. |
| | These are the optimum storage conditions for the rechargeable battery. Storing the rechargeable battery at conditions outside these specifications can reduce the capacity of the battery or damage the battery. | |
| Recommended periodic battery exchange | Every 3 years. Improper handling of the battery, as e. g. storage outside the specified temperature range can reduce the battery life. | |

Tab. 8-6 Technical Specifications - Storage period Battery

| Energy management and power consumption | | |
|---|---|---|
| Internal power supply, battery | Replaceable and chargeable lithium ion (Li-Ion) battery. | |
| | Capacity | 4.4 Ah at 7.4 V Nominal voltage (P/N 04120.21) |
| | | 5.7 Ah at 7.4 V Nominal voltage (P/N 04120.23) |
| | Power consumption, max., charging current | 3 A |
| | Output current, max. | 4.4 A continuous (P/N 04120.21) |
| | | 8.8 A continuous (P/N 04120.23) |
| | | 10 A for 10 s |

| Energy management and power consumption | | |
|---|---|---|
| External power supply | Approved input voltage range | ⩾10 V |
| | | Typical 12 V |
| | | ⩽14 V |
| | Protection of the on-board power supply, 12 V | 15 A, time lag fuse (T)<br>Additional consumers on-board not taken into account |
| AC adapter corpuls3/corpuls1 | Output power, maximum | 108 W |
| | Voltage, nominal | 12 V |
| | Output current, maximum | 9 A |
| | Protection class against electrical shock when operated via mains charger (according to IEC 60601-1) | I |
| Power consumption of the device, typical | Thermal power dissipation (device function) | 10 W |
| | Maximum power consumption<br>(device operation and battery charging) | 40 W |
| | Maximum power consumption<br>(Device operation and charging of defibrillator, max. 10 s) | 100 W |
| Charging time battery | From 0 % to 80 % | approx. 1 h (P/N 04120.21) |
| | | approx. 1.5 h (P/N 04120.23) |
| | From 0 % to 90 % | approx. 1.5 h (P/N 04120.21) |
| | | approx. 2 h (P/N 04120.23) |
| | From 0 % to 100 % | approx. 2 h (P/N 04120.21) |
| | | approx. 3 h (P/N 04120.23) |
| Operating time of the device | Factory settings without power saving (autoDim) mode | approx. 5.5 h (P/N 04120.21) |
| | | approx. 7 h (P/N 04120.23) |
| | Factory settings inverted, lowest brightness level | approx. 8.75 h (P/N 04120.21) |
| | | approx. 9.25 h (P/N 04120.23) |
| | Factory settings, ECG and SpO2 active | approx. 6.5 h (P/N 04120.21) |
| | | approx. 6.75 h (P/N 04120.23) |
| | Factory settings, without accessories connected | approx. 7.3 h (P/N 04120.21) |
| | | approx. 7.25 h (P/N 04120.23) |

Tab. 8-7 Technical specifications - Energy management and power consumption

**⚠ WARNING!**

Electrical shock when operating the AC adapter without protective conductor!

The user could suffer electrical shock and possible health issues.

► Connect the AC adapter only to a mains voltage supply with a protective conductor.

### Memory capacity

| Component | Memory capacity | |
|---|---|---|
| ECG data set<br>(1-lead recording of lead II or shock paddle ECG) | Memory capacity required for ECG recording | For 45 min approx. 3.2 MB |
| | | For 60 min approx. 4.3 MB |
| Event-/Mission data set | Memory capacity required for events | For 45 min approx. 90 KB |
| | | For 60 min approx. 100 KB |
| | Necessary memory space of a mission directory | For 45 min approx. 3.5 MB |
| | | For 60min approx. 4.5 MB |
| Internal memory | Depending on configuration for mission recording | Up to 185 h for 1 GB total memory<br>NOTE:<br>The maximum mission duration depends on the available capacity of the internal memory. |
| External SD card | Depending on configuration for mission recording | Up to 408 h per 2 GB |

Tab. 8-8 Technical Specifications - Memory capacity

### Screen

| Screen | | | |
|---|---|---|---|
| Type | 5.7 in TFT colour screen VGA | | |
| Definition | Horizontal | 640 pixels | |
| | Vertical | 480 pixels | |
| Visible screen | Width | 11.52 cm | 4.54 in |
| | Height | 8.64 cm | 3.40 in |
| Angle of view | Horizontal | 160 ° | |
| | Vertical | 115 ° | |
| Backlighting | Life | approx. 15000 h | |

Tab. 8-9 Technical Specifications - Screen

### Volume level Alarm tones

| Volume level Alarm tones | | |
|---|---|---|
| Alarms tone, medium and high priority | Value 3 | 57 dB |
| | Value 10 | 80 dB |

Tab. 8-10 Technical Specifications - Volume level Alarm tones

### Alarm management

| Characteristic of alarm signal | High priority | Medium priority | Low priority | Reminder signal |
|---|---|---|---|---|
| Number of impulses | 10 | 3 | 24 | 1 |
| Impulse duration | 90 ms | 130 ms | 190 ms | 110 ms |
| Interval of impulses | 50 ms (190 ms) | 250 ms | 250 ms | n/a |
| Frequency of impulses | 523 Hz, 659 Hz,<br>784 Hz, 1047 Hz, | 523 Hz, 659 Hz,<br>784 Hz | 523 Hz, 659 Hz | 3.5 kHz |
| Interval | 10 s | 20 s | n/a | 60 s |

| Characteristic of alarm signal | High priority | Medium priority | Low priority | Reminder signal |
|---|---|---|---|---|
| Colour of LED | Red | Yellow | Cyan | White |
| Flashing frequency of LED | 2 Hz | 0.5 Hz | n/a | n/a |
| Duty cycle of the LED | 40 % on | 40 % on | 100 % on | 110 ms |

Tab. 8-11 Technical specifications - alarm signal

Listed in the following are the maximum alarm delay times for the alarms of the vital parameters.

| Vital parameters | Total delay time (maximum delay) | |
|---|---|---|
| HR | 9 s | |
| $SpO_2$ | Averaging time | Delay |
| | 2 s to 4 s | 13 s |
| | 4 s to 6 s | 15 s |
| | 8 s | 21 s |
| | 10 s | 23 s |
| | 12 s | 24 s |
| | 14 s | 32 s |
| | 16 s | 32 s |
| PI | 30 s | |
| PR | 16 s | |
| SpMet | 60 s | |
| SpCO | 57 s | |
| SpHb | 114 s | |
| The maximum delay until the signalling of an alarm for ECG and pulse oximetry is 5 s.<br>The maximal delay until alarming for loose ECG electrodes is 30 s ±3 s. | | |

Tab. 8-12 Technical Specifications - Alarm system delays

**Information tones (without alarm tones)**

| Feature of the information signal | Key tone/softkey tone | Shock ready tone | Metronome tone | QRS/PT tone |
|---|---|---|---|---|
| Number of impulses | 1 | 1 | Depending on the settings | 1 |
| Impulse duration | 25 ms | Ends with shock readiness or shock abort | Depending on the settings | 110 ms |
| Frequency of impulses | 900 Hz | 1.5 kHz | Depending on the settings | Depending on the settings |
| Interval | n/a | n/a | Depending on the settings | Current heart rate of the patient |
| Volume level | 50 dB | 73 dB | 50 dB to 65 dB | 69 dB |

| Feature of the information signal | Key tone/softkey tone | Shock ready tone | Metronome tone | QRS/PT tone |
|---|---|---|---|---|
| Tone description | Very short beep tone | Aggressive and warning sawtooth tone that does not end until the HV capacitor is discharged | Short click tones with a short pause after 15 or 30 repetitions, during which two ventilation tones are played, if so configured by the OPERATOR | Short beep tone on each heartbeat of the patient |

Tab. 8-13 Technical Specifications - Information tones (without alarm tones)

**ECG monitoring**

| ECG - General Specifications | |
|---|---|
| Amplifier input | Type CF, insulated > 5 kV, defibrillation-proof |
| Frequency input | 0.05 Hz to 150 Hz (-3 dB) |
| Input impedance | >5 MΩ |
| Common mode rejection (CMRR) | >90 dB |
| Dynamic range | ±350 mV (signal voltage) |
| Maximum electrode offset voltage | ±300 mV (input offset) |
| Scanning frequency | 1000 Hz |
| Digital definition | ≈0.8 µV/bit |
| Detection of implanted pacer | ⩾20 mV/0.2 ms |
| Electrode detection (ECG) according to IEC 60601-2-27 | 24 nA (maximum current) |
| Active noise cancellation (RL) | <250 nA |

Tab. 8-14 Technical Specifications - ECG, general

| Leads | | |
|---|---|---|
| 4-pole ECG monitoring cable | M-ECG | I, II, III, aVR, aVL, aVF, -aVR |

Tab. 8-15 Technical Specifications - ECG leads

| Heart rate | | |
|---|---|---|
| Heart rate display | 18 /min to 300 /min | |
| Heart rate detection | Arithmetic averaging of the last eight RR intervals, 30 s to 5 s (18 /min to 300 /min) | |
| Deviation | ⩽ ±5 /min or ⩽ ±5 % | |
| Maximum T-wave rejection capability according to IEC 60601-2-27 | Ventricular bigeminy (A1) | 80 /min |
| | Slow changing ventricular bigeminy (A2) | 90 /min |
| | Fast changing ventricular bigeminy (A3) | 120 /min |
| | Bidirectional systoles | 90 /min |
| Response time of the heart rate after changes in heart rate according to IEC 60601-2-27 | Abrupt increase, 80 /min to 120 /min | 5 s |
| | Abrupt decrease 4 s, 80 /min to 40 /min | 4 s |
| Alarm time for tachycardia according to IEC 60601-2-27 | VT/VF 1 mV (B1) | 7 s |
| | VT/VF 2 mV (B1 x2) | 7 s |
| | VT/VF 0.5 mV (B1 /2) | 9 s |
| | VT/VF 2 mV (B2) | 7 s |
| | VT/VF 4 mV (B2 x2) | 7 s |
| | VT/VF 1 mV (B2 x2) | 7 s |

Tab. 8-16 Technical Specifications - Heart Rate

## ECG analysis

### Procedure

The ECG analysis is performed by a program which analyses the ECG in up to three blocks of 4 seconds with the following result:

- ⟨Shock recommended⟩
- ⟨Shock not recommended⟩

The ECG analysis evaluates each of the three blocks and then weighs these individual scores.

| | Maximum duration of ECG analysis (12 s) | | | Result |
|---|---|---|---|---|
| Start | Block 1 (4 s) | Block 2 (4 s) | Block 3 (4 s) | Refractory time (4 s) |

Tab. 8-17 Technical Specification - Maximum duration of the ECG analysis

If two of the three blocks yield the result "Shock recommended", the overall result is ⟨Shock recommended⟩. If two of the three blocks yield the result ⟨Shock not recommended⟩, the overall result is ⟨Shock not recommended⟩.

If the result ⟨Shock recommended⟩ is definite after 8 s or 12 s, a refractory time of 8 s begins. The ECG analysis does not revise the result during the refractory time so that the user can apply the shock paddles on the patient and deliver a shock. The result of the ECG analysis does not suspend the readiness for shock, because this would cause disruptions. This refractory time would only be interrupted if a new analysis were started.

If the expected result is unambiguous early on, the ECG analysis accelerates some procedures in the process:

| | ECG analysis | | Result |
|---|---|---|---|
| Result | ⟨Shock recommended⟩ | ⟨Shock recommended⟩ | ⟨Shock recommended⟩ (e. g. 200 J) |
| Start | Block 1 (4 s) | Block 2 (4 s) | Refractory time (8 s) |
| | | ⟨Charging⟩ | Ready for shock |

Tab. 8-18 Technical specifications - Acceleration of the ECG analysis process

If the first block yields the result ⟨Shock recommended⟩, the corpuls1 will immediately begin to charge energy, to reduce the amount of time from beginning of analysis to readiness to shock.

If the overall outcome is already determined after two analysis blocks with a positive result, the third will be omitted by the ECG analysis and readiness to shock will begin as soon as the device has finished charging.

The following are defined as shockable rhythms:

- Ventricular fibrillation (VF)
- Ventricular tachycardia (VT) f >180 /min

ECG database for validation of the analysis software (Origin of the data)

The ECG data used originate from recordings from the Creighton University Ventricular Tachyarrhythmia Database (1), (2), (3) as well as from the Massachusetts Institute of Technology – Beth Israel Hospital (MITBIH) Malignant Ventricular Arrhythmia Database (4), (5), (6). These were recorded with common patient monitors similar to the corpuls1.

Application on validation of the analysis software (Scope of measurements)

A total of 1816 16 -s long measurements from ECG sections which constitute a representative cross-section of all ECGs have been included for validation of the analysis software. These measurements were classified by a cardiologist with regard to ECG rhythms and shockability. The threshold between an asystole and a VF was set at an amplitude of 140 µV and the threshold between a shockable and a non-shockable VT at a heart rate of 180 /min. The measurements contained in this database were not used for development. Performance goals for arrhythmia analysis algorithms (artifact free) as recommended by the American Heart Association (7).

| Rhythms | Test sample size total (required minimum) | Observed performance |
|---|---|---|
| "Shockable" | 736 (250) | -- |
| Coarse VF Amplitude >140 µV | 591 (200) | 92.22 % |
| Rapid VT | 145 (50) | 100 % |
| "Nonshockable" | 1058 (230) | -- |
| Normal sinus rhythm (NSR) | 480 (100 arbitrary) | 98.75 % |
| Atrial fibrillation/-flutter (AF), sinus bradycardia (SB), supraventricular tachycardia (SVT), heart block, idioventricular, premature ventricular contractions (PVCs) | 392 (30 arbitrary) | 99.49 % |
| Asystole | 186 (100 for safety) | 91.40 % |

Tab. 8-19 Technical Specifications - Classification table

(1) Goldberger AL, Amaral LAN, Glass L, Hausdorff JM, Ivanov PCh, Mark RG, Mietus JE, Moody GB, Peng C-K, Stanley HE. PhysioBank, PhysioToolkit, and PhysioNet: Components of a New Research Resource for Complex Physiologic Signals. Circulation 101(23):e215-e220 [Circulation Electronic Pages; https://aha-journals.org/doi/10.1161/01.CIR.101.23.e215; 2000 (June 13).

(2) Nolle FM, Badura FK, Catlett JM, Bowser RW, Sketch MH. CREI-GARD, a new concept in computerized arrhythmia monitoring systems. Computers in Cardiology 13:515-518 (1986).

(3) See https://physionet.org/content/cudb/1.0.0/

(4) Guidelines for cardiopulmonary resuscitation and emergency cardiac care. Emergency Cardiac Care Committee and Subcomittees, American Heart Association. JAMA. 1992;268:2171-2302.

(5) Greenwald SD. Development and analysis of a ventricular fibrillation detector. M.S. thesis, MIT Dept. of Electrical Engineering and Computer Science, 1986.

(6) See also https://physionet.org/content/vfdb/1.0.0/

(7) Kerber, Richard E. (1997): Automatic external defibrillators for public access defibrillation. Recommendations for specifying and reporting arrhythmia analysis algorithm performance, incorporating new waveforms, and enhancing safety. A Statement for Health Professionals From the American Heart Association Task Force on Automatic External Defibrillation, Subcommittee on AED Safety and Efficacy. With assistance of Lance B. Becker, Joseph D. Bourland, Richard O. Cummins, Alfred P. Hallstrom, Mary B. Michos, Graham Nichol et al. Dallas, TX: American Heart Association (Scientific statement).

Assessment and result (Decision-making reliability of the ECG analysis programme)

The following table refers to the ECG analysis program of the various operating modes:

- in AED mode, a therapy recommendation is issued.
- in monitoring mode, manual mode and pacing mode, a potential alarm to a shockable rhythm (ventricular fibrillation or ventricular tachycardia with f >180 /min) is issued.

| Decision-making reliability of the ECG analysis programme | |
|---|---|
| Sensitivity and specificity | The quality of an ECG analysis programme is determined by the values sensitivity and specificity |
| Performance indicators | According to the recommendation of general guidelines, test ECGs of the *intermediate* class are not included in the calculation of sensitivity or specificity. For the evaluation of the performance of the algorithm the following performance indicators were defined:<br>a = number of correct positive decisions<br>b = number of false positive decisions<br>c = number of false negative decisions<br>d = number of correct negative decisions |
| Total number of measurements | 1816 |
| **Result** | **Value** |
| a | 712 |
| b | 20 |
| c | 46 |
| d | 1038 |
| This therefore yields: | |
| Sensitivity = a/ (a+c)<br>required >90 % according to recommendations of the general guidelines for therapy) | 0.9393 |
| Positive predictive value =<br>a/ (a+b) | 0.9727 |
| False positive ratio = b/(b+d) | 0.0189 |
| Specificity = d/(b+d)<br>(required >95 % for asystoles, according to general guidelines for therapy) | 0.9811 |

Tab. 8-20 Technical specifications - Decision-making reliability of the ECG analysis programme

**ECG with therapy electrodes**

| ECG with therapy electrodes | | |
|---|---|---|
| Amplifier input | corPatch easy electrodes;<br>Shock spoons | Type CF insulated >5 kV,<br>defibrillation proof |
| | Shock paddles | Type BF insulated >5 kV,<br>defibrillation proof |
| Frequency input | 0.05 Hz to 150 Hz (-3 dB) | |
| Input impedance | >180 kΩ (DC) | |
| Common mode rejection (CMRR) | -44 dB | |
| Dynamic range | ±310 mV (signal voltage) | |
| Maximum electrode offset voltage | ±300 mV (input offset) | |
| Scanning frequency | 1000 Hz | |
| Digital definition | 4.89 µV/bit | |

| ECG with therapy electrodes | |
|---|---|
| Maximum auxiliary current through the patient for impedance measurement DE | <10 µA (32 kHz) |

Tab. 8-21 Technical Specifications - ECG with therapy electrodes

**Pulse Oximetry Monitoring** **Option (SpO2, SpCO, SpHb, SpMet - Manufacturer Masimo)**

| Pulse oximetry sensor - General Specifications | | |
|---|---|---|
| Amplifier input | Typ BF, insulated >5 kV, defibrillation-proof | |
| Alarm | SpO2 | Lower alarm limit 65 % to 99 %<br>Upper alarm limit 90 % to 100 % |
| | PR | Lower alarm limit 25 /min to 100 /min<br>Upper alarm limit 70 /min to 200 /min |
| Updating frequency of display<br>(SpO2, PR and PI) | 1 Hz | |
| Band width | 0.5 Hz to 6 Hz | |
| Wavelength with maximum intensity | 500 nm to 1400 nm | |
| Radiated power of the light for the basic pulse oximetry sensor (type: LNCS and M-LNCS) | ⩽ 15 mW (pulsed, at 50 mA) | |
| Radiated power of the light for advanced oximetry option with Masimo rainbow SET® technology | 25 mW (pulsed, at 100 mA) | |
| Measurement range | SpO2 | 1 % to 100 % |
| | PR | 25 /min to 240 /min |
| | PI | 0.02 % to 20 % |
| Calibrated measurement range | SpO2 | 70 % to 100 % |
| | PR | 25 /min to 240 /min |
| | PI | 0.1 % to 20 % |
| Calibration | By reference measurements with fractional saturation measurement. On pulse oximetric haemoglobin oxygen saturation with dyshaemoglobin-free blood. | |
| Definition | SpO2 | 1 % |
| | PR | 1 /min |
| | SpCO | 1 % |
| | SpMet | 0.1 % |
| | SpHb | 0.1 g/dl |
| | | 0.1 mmol/l |
| | PI | 0.1 % |

| Pulse oximetry sensor - General Specifications | | |
|---|---|---|
| Accuracy | Oxygen saturation measurement | ⩽2 % (70 % to 100 %, static measurement)<br>⩽3 % (70 % to 100 %, (measurement in motion)<br>⩽3 % (50 % to 69 %) |
| | Pulse rate measurement | ⩽3 /min (25 /min to 240 /min, (static measurement)<br>⩽5 /min (25 /min to 240 /min, (measurement in motion) |
| | SpHb | ⩽1 g/dl |
| | | ⩽1 % |
| | SpCO | ⩽3 % |
| SpO2 curve | Standardised, according to EN 9919 | |

Tab. 8-22 Technical specifications - Pulse oximetry sensor, general (option SpO2, SpCO, SpHb, SpMet, Masimo Rainbow SET® Technology)

Pulse oximetry sensors are defined as surface devices with skin contact for longer contact duration (> 24 h to 30 d) as defined in ISO 10993-1 (Biological Evaluation of Medical Devices - Part 1: Guidance on the Selection of Tests). The pulse oximetry sensors that come in contact with the patient require the following biocompatibility tests: cytotoxicity, sensitisation and irritation, or intracutaneous reactivity. All materials coming into contact with patients passed (see XIII Masimo Safety Information on page 244).

Use only approved accessories and approved combinations with other devices. A list of Approved Accessories can be found at (see VI Approved accessories and consumables on page 210).

**Defibrillator**

| Defibrillator output | | |
|---|---|---|
| Insulated application part with insulation voltage >5 kV<br>The type is determined by the kind of therapy electrodes used. | Disposable therapy electrodes, Type CF insulated | corPatch easy |
| | | corPatch easy pre-connected |
| | | corPatch easy Pediatric/Pediatric Extended |
| | Shock paddles, Type BF, insulated | Shock paddle |
| | | Baby shock electrodes<br>The energy level is reduced at a ratio of 1:10 |
| | Shock spoons, type CF insulated | |

Tab. 8-23 Technical Specifications - Defibrillator, general

| Conductive surface of therapy electrodes | | | |
|---|---|---|---|
| corPatch easy | | Approx. 81 $cm^2$ | Approx. 12.46 sq in |
| corPatch easy pre-connected | | Approx. 87 $cm^2$ | Approx. 13.38 sq in |
| corPatch easy Pediatric/Pediatric Extended | | Approx. 42 $cm^2$ | Approx. 6.46 sq in |
| Shock paddles | Shock paddles for adults | 53 $cm^2$ | Approx. 8.15 sq in |
| | Shock paddles with baby shock electrodes | 16.6 $cm^2$ | Approx. 2.55 sq in |

| Conductive surface of therapy electrodes | | | |
|---|---|---|---|
| Shock spoons | Size A | 11.00 $cm^2$ | Approx. 1.69 sq in |
| | Size B | 18.25 $cm^2$ | Approx. 2.81 sq in |
| | Size C | 46.60 $cm^2$ | Approx. 7.17 sq in |

Tab. 8-24 Technical specifications - Conductive surface of therapy electrodes

| Defibrillation and Cardioversion | | |
|---|---|---|
| Charging status indicator | Indicated by the following message during the charging process: ⟨Charging⟩ | |
| Ready for shock | Indicated by the message ⟨Deliver shock⟩ and by the ready signal. The **Shock** key is flashing red. | |
| Delay time between R-wave and shock impulse | ⩽15 ms | |
| Energy level display | In digits on the screen | |
| Softkey Context Menu Synchronisation | Manual mode | Automatic recognition of asynchronous and synchronous defibrillation.<br>Indicated by SYNC and ASYNC. |
| | AED mode | Defibrillation is always performed asynchronously.<br>No indication of ASYNC. |
| Internal discharge | 0.5 s after release of shock with high patient impedance | |
| | Manual mode | 30 s after device is ready for shock, unless the user has pressed the softkey [Cancel] in the meantime |
| | AED mode | 30 s after the message ⟨Deliver shock⟩ appears. |
| Test Defibrillator | External **Testload/Testbox/corpuls simulator** with 50 Ω resistance | |

Tab. 8-25 Technical Specifications - Defibrillation and cardioversion

### Biphasic defibrillator

| General Specifications | | |
|---|---|---|
| Number of possible shocks per battery load (fully charged) | At least 225 shocks with 200 J (P/N 04120.21) | |
| | At least 225 shocks with 200 J (P/N 04120.23) | |
| AED mode | Max. time from start of ECG analysis to 'Ready for shock'. | <12 s |
| | Max. time from start of ECG analysis to 'Ready for shock'. After release of 15 shocks with maximum energy. | < 12 s (no difference to fully charged battery) |
| | Max. time from switch on of the corpuls1 to 'Ready for shock' | <30 s |
| Manual mode | corpuls1 charging time to maximum energy (with battery fully charged) | Approx. 5.5 s |
| | corpuls1 charging time to max. energy after release of 15 shocks | Approx. 5.5 s (no difference to fully charged battery) |
| | Charging time of the corpuls1 high voltage unit from switch on of the corpuls1 to max. energy | <25 s |

| General Specifications | | |
|---|---|---|
| Impulse waveform | Biphasic, typical | Positive rectangular impulse 4 ms to 7 ms (90 % energy) |
| | | Negative rectangular impulse 3 ms to 4 ms (10 % energy) |
| | | May vary slightly depending on the impedance |
| Patient impedance range within which a shock can be delivered | corPatch easy electrodes | >15 Ω to 600 Ω |
| | Shock paddles | >15 Ω to 600 Ω |
| | Shock spoons | ≥1 Ω to ≤600 Ω |
| Deviation of delivered energy with an impedance of 50 Ω | ≤10 % | |

Tab. 8-26 Technical Specifications - Biphasic Defibrillator

The following table shows all energy levels that the user can configure via softkey context menu or in individual steps. When the energy can be selected in individual steps, the increments are the same for all types of therapy electrodes. Just the upper limit varies in different types of therapy electrodes.

The increments for individual steps for corPatch easy electrodes and shock paddles are as follows:

- 1 J
- From 4 J to 40 J in increments of 4 J.
- From 40 J to 100 J in increments of 5 J.
- From 100 J to 200 J in increments of 10 J.

The increments for individual steps for shock spoons are as follows:

- 1 J to 5 J, in increments of 1 J.
- From 5 J to 50 J in increments of 5 J.

| Biphasic Defibrillator - Energy levels | | |
|---|---|---|
| Energy levels for defibrillation and cardioversion with corPatch easy electrodes | AED mode, Patient class Adult | Softkey context menu:<br>100 J, 120 J, 150 J, 200 J |
| | AED mode, Patient class Child | Softkey context menu:<br>20 J, 40 J, 70 J, 100 J |
| | AED mode, Patient class Neonate | Softkey context menu:<br>12 J, 24 J, 36 J, 50 J |
| | Manual mode, Patient class Adult | Softkey context menu:<br>100 J, 120 J, 150 J, 200 J |
| | | Individual steps:<br>From 1 J to 200 J |
| | Manual mode, Patient class Child | Softkey context menu:<br>20 J, 40 J, 70 J, 100 J |
| | | Individual steps:<br>From 1 J to 100 J |
| | Manual mode, Patient class Neonate | Softkey context menu:<br>12 J, 24 J, 36 J, 50 J |
| | | Individual steps:<br>From 1 J to 50 J |
| Energy levels for defibrillation and cardioversion with shock paddles | Manual mode, Patient class Adult | Softkey context menu:<br>100 J, 120 J, 150 J, 200 J |
| | | Individual steps:<br>From 1 J to 200 J |
| | Manual mode, Patient class Child | Softkey context menu:<br>20 J, 40 J, 70 J, 100 J |
| | | Individual steps:<br>From 1 J to 100 J |
| | Manual mode, Patient class Neonate | Softkey context menu:<br>50 J, 100 J, 150 J, 200 J |
| | NOTE:<br>If baby shock electrodes are used, the corpuls1 automatically reduces the energy to 10 % of the selected value. | Individual steps:<br>From 1 J to 200 J |
| Energy levels for defibrillation and cardioversion with shock spoons | Manual mode, Patient class Adult | Softkey context menu:<br>15 J, 25 J, 35 J, 50 J |
| | | Individual steps:<br>From 1 J to 50 J |

Tab. 8-27 Technical Specifications - Biphasic Defibrillator - Energy Levels

The following table shows the accuracy of the energy output via corPatch easy therapy electrodes and shock paddles.

| Energy selected (in Joule) | Nominal energy released in comparison to patient impedance<br>Load impedance (in Ohm) | | | | | | | Accuracy |
|---|---|---|---|---|---|---|---|---|
| | 25 | 50 | 75 | 100 | 125 | 150 | 175 | |
| 1 | 1.0 | 1.1 | 1.4 | 1.2 | 1.2 | 1.2 | 1.1 | ±3 J |
| 24 | 3.8 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | ±3 J |
| 8 | 7.6 | 8.2 | 8.4 | 8.2 | 8.2 | 8.4 | 8.4 | ±3 J |
| 12 | 11.2 | 12.3 | 12.5 | 12.2 | 12.2 | 12.3 | 12.2 | ±3 J |
| 16 | 15.2 | 16.3 | 16.5 | 16.6 | 16.0 | 16.2 | 16.1 | ±3 J |
| 20 | 18.8 | 20.5 | 20.9 | 20.6 | 20.2 | 20.4 | 20.0 | ±3 J |
| 24 | 23.0 | 24.7 | 24.9 | 24.8 | 24.5 | 24.3 | 24.5 | ±15 % |
| 28 | 26.6 | 28.7 | 28.8 | 28.6 | 28.5 | 28.2 | 28.0 | ±15 % |
| 32 | 30.0 | 32.8 | 33.3 | 32.8 | 32.5 | 32.1 | 32.2 | ±15 % |
| 36 | 34.0 | 36.6 | 37.1 | 36.6 | 36.2 | 36.6 | 36.1 | ±15 % |
| 40 | 37.2 | 40.9 | 41.1 | 40.8 | 40.2 | 40.5 | 40.2 | ±15 % |
| 45 | 41.8 | 45.8 | 46.4 | 45.8 | 45.0 | 45.6 | 45.1 | ±15 % |
| 50 | 46.2 | 50.6 | 51.5 | 50.6 | 50.2 | 50.7 | 50.1 | ±15 % |
| 55 | 50.8 | 55.2 | 56.3 | 55.8 | 55.0 | 55.5 | 55.0 | ±15 % |
| 60 | 55.2 | 60.9 | 61.1 | 60.8 | 60.2 | 60.3 | 59.9 | ±15 % |
| 65 | 60.2 | 65.6 | 66.8 | 65.8 | 65.7 | 65.1 | 64.8 | ±15 % |
| 70 | 64.8 | 70.6 | 71.4 | 70.8 | 70.5 | 69.9 | 69.3 | ±15 % |
| 75 | 69.0 | 75.5 | 77.0 | 76.0 | 75.5 | 75.0 | 74.6 | ±15 % |
| 80 | 72.8 | 80.3 | 81.5 | 80.8 | 80.5 | 80.1 | 79.5 | ±15 % |
| 85 | 77.8 | 85.5 | 86.3 | 85.8 | 85.5 | 84.9 | 84.0 | ±15 % |
| 90 | 82.8 | 90.4 | 91.2 | 90.4 | 90.2 | 90.0 | 90.0 | ±15 % |
| 95 | 87.0 | 95.2 | 95.9 | 95.8 | 95.5 | 94.8 | 94.9 | ±15 % |
| 100 | 91.8 | 100.3 | 101.4 | 101.4 | 101.2 | 99.6 | 98.7 | ±15 % |
| 110 | 100.4 | 110.2 | 111.2 | 110.2 | 110.2 | 110.0 | 109.9 | ±15 % |
| 120 | 109.4 | 120.1 | 121.7 | 120.6 | 120.5 | 121.2 | 120.1 | ±15 % |
| 130 | 118.2 | 130.3 | 131.7 | 130.6 | 130.2 | 129.6 | 139.9 | ±15 % |
| 140 | 127.8 | 139.3 | 141.8 | 140.8 | 140.0 | 141.6 | 139.7 | ±15 % |
| 150 | 135.8 | 149.9 | 152.0 | 150.6 | 149.7 | 151.2 | 149.8 | ±15 % |
| 160 | 145.0 | 159.6 | 161.9 | 160.8 | 160.0 | 161.4 | 158.6 | ±15 % |
| 170 | 154.4 | 169.6 | 171.0 | 170.0 | 169.5 | 170.4 | 167.3 | ±15 % |
| 180 | 163.0 | 179.1 | 181.8 | 180.2 | 180.0 | 179.4 | 175.7 | ±15 % |
| 190 | 171.6 | 189.7 | 192.2 | 190.0 | 190.0 | 188.1 | 183.8 | ±15 % |
| 200 | 180.0 | 199.8 | 203.7 | 200.4 | 199.5 | 198.3 | 191.8 | ±15 % |

Tab. 8-28 Technical specifications - Precision of the energy released for corPatch easy electrodes

The following table shows the precision of the energy released for shock spoons.

| Energy selected (in Joule) | Nominal energy released in comparison to patient impedance<br>Load impedance (in Ohm) | | | | | | | Accuracy |
|---|---|---|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 50 | 100 | 150 | |
| 2 | 1.5 | 1.5 | 1.7 | 1.7 | 2.2 | 2.1 | 2.0 | ±3 J |
| 5 | 4.0 | 4.2 | 4.5 | 4.9 | 5.6 | 5.5 | 5.2 | ±3 J |
| 10 | 8.8 | 9.2 | 9.0 | 9.2 | 11.2 | 11.0 | 10.2 | ±15 % |
| 20 | 18.1 | 19.4 | 20.2 | 20.8 | 22.8 | 23.7 | 22.6 | ±15 % |
| 30 | 26.4 | 28.6 | 29.5 | 31.3 | 24.5 | 23.4 | 32.7 | ±15 % |
| 40 | 36.8 | 37.7 | 39.8 | 40.8 | 45.9 | 45.8 | 43.3 | ±15 % |
| 50 | 46.3 | 49.6 | 49.2 | 51.2 | 57.7 | 56.1 | 54.7 | ±15 % |

Tab. 8-29 Technical specifications - precision of the energy released for corPatch easy therapy electrodes

The following illustration shows the biphasic shock impulse with 200 J at different patient impedances. The waveform of the shockwave is comprised of a positive rectangular waveform (4 ms to 7 ms duration) and a negative rectangular waveform (3 ms to 4 ms). The positive rectangular waveform is 90 %, the negative rectangular waveform 10 % of the total energy. The amplitude and the duration of the rectangular waveforms are adjusted automatically to the patient's impedance.

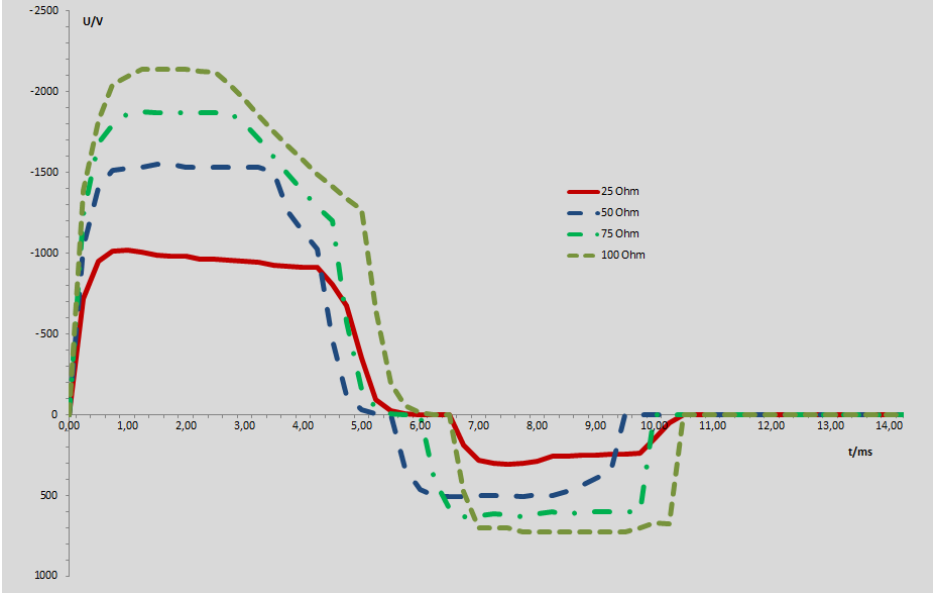



Fig. 8-4 Biphasic shock impulse - Impedances of 25 Ohm to 100 Ohm

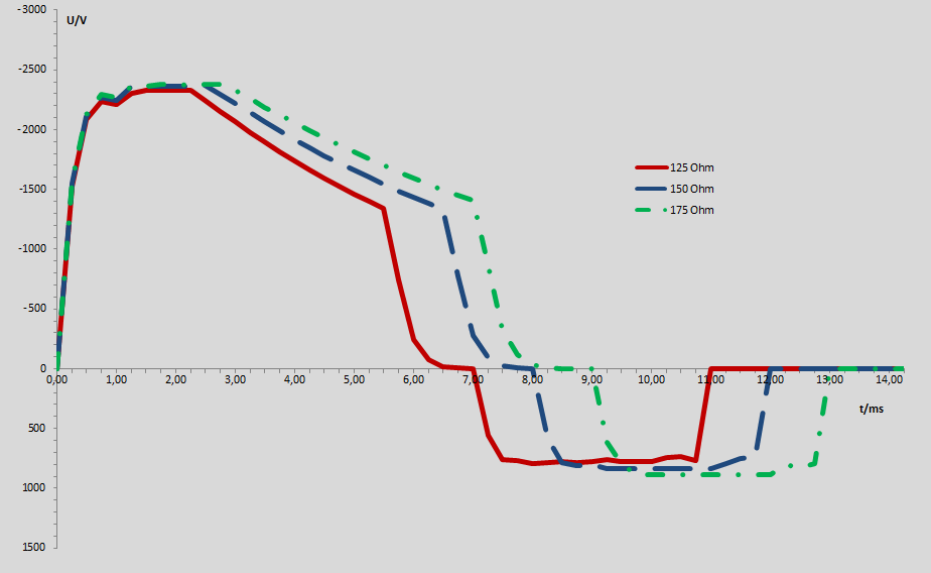



Fig. 8-5 Biphasic shock impulse - Impedances of 125 Ohm to 175 Ohm

## Pacer

| Pacer - General Specifications | |
|---|---|
| Modes | FIX mode |
| | DEMAND mode |
| Output | Application part Type BF, insulated >5 kV |
| Pacing frequency<br>(FIX- and DEMAND mode) | From 30 /min to 180 /min, in increments of 5 /min |
| Intensity of the pacer pulse<br>(FIX- and DEMAND mode) | From 10 mA to 150 mA in increments of 5 mA |
| Impulse duration | 40 ms (Rectangular impulse) |

Tab. 8-30 Technical Specifications - Pacer, general

corPatch CPR feedback sensor (Option) - General Specifications

| corPatch CPR feedback sensor - General specifications | | |
|---|---|---|
| Amplifier input | Type BF insulated >5 kV, defibrillation-proof | |
| Function principle (sensor) | Acceleration sensor | |
| Displayed parameters | Combined curve for display of compression depth and compression rate | |
| | CPR rate (compression rate) | |
| Measurement range | 70 to 150 compressions/min | |
| | 1.9 cm to 16.16 cm | 0.75 in to 4.0 in |
| Measurement interval | Continuous | |
| Operating temperature (sensor) | -20 °C to +60 °C | -28.9 °F to +131 °F |
| Storage temperature (sensor) | -30 °C to +65 °C | -22 °F to +149 °F |
| Relative humidity (sensor) | ≤93 % (without condensation) | |
| Air humidity during storage (Sensor) | ≤95 % (without condensation) | |
| Sensor dimensions (height x width with foam padding) | 110 mm x 64 mm | 4.0 in x 2.5 in |
| Sensor weight (with cable) | 50.2 g | |
| Sensor weight (without cable) | 28.8 g | |
| Accuracy - Rate | ±3 compressions/min | |
| Accuracy - depth | ±0.635 cm | ±0.25 in |
| Protection against water and dust | IP66 | |

Tab. 8-31 Technical Specifications - General corPatch CPR feedback sensor

primeCPR easy feedback sensor (Option) - General Specifications

| primeCPR easy feedback sensor - General Specifications | | |
|---|---|---|
| Measurement range | 70 to 150 compressions/min | |
| | 1.0 cm to 10.0 cm | 0.39 in to 3.94 in |
| Measurement interval | 500 Hz | |
| Operating temperature (sensor) | -20 °C to +55 °C | -28.9 °F to +131 °F |
| Storage temperature (sensor) | -40 °C to +70 °C | -40 °F to +158 °F |
| Relative humidity (sensor) | ≤93 % (without condensation) | |
| Air humidity during storage (Sensor) | ≤95 % (without condensation) | |
| Sensor size (Length x Width x Depth) | 85 mm x 60 mm x 16.7 mm | 3.35 in x 2.36 in x 0.66 in |
| Sensor weight | approx. 50.0 g | |
| Cable length Sensor | 0.6 m | 23.62 in |
| Cable length Intermediate cable | 1.4 m | 55.12 in |
| Accuracy - Rate *) | ±4 compressions/min | |
| Accuracy - depth *) | ±0.5 cm | ±1.97 in |
| Protection against water and dust | IP66 | |
| Power supply | 5 V supply voltage via USB | |

Tab. 8-32 Technical Specifications - General primeCPR easy feedback sensor (Option)

primeCPR feedback sensor (Option) - General Specifications

| primeCPR feedback sensor - General Specifications | | |
|---|---|---|
| Dimensions (Length x Width x Depth) | 105 mm x 65 mm x 25 mm | 4.13 in x 2.56 in x 0.98 in |
| Sensor weight | approx. 152 g | |
| Cable length | 2 m | 78.74 in |
| Temperature (Operation) | -5 °C to +50 °C | +23 °F to +122 °F |
| Pressure (Operation) | 540 hPA to 1200 hPA | |
| Humidity (Operation) | 15 % to 95 % Humidity (without condensation) | |
| Temperature (Storage) | +5 °C to +50 °C | +41 °F to +122 °F |
| Pressure (Storage) | 500 hPA to 1060 hPA | |
| Humidity (Storage) | 10 % to 95 % Humidity (without condensation) | |
| Temperature (Transport) | -10 °C to +50 °C | +14 °F to +122 °F |
| Pressure (Transport) | 500 hPA to 1060 hPA | |
| Humidity (Transport) | 10 % to 95 % Humidity (without condensation) | |
| Accuracy - Rate | ±3 compressions/min | |
| Accuracy - Compression depth | ± 5 % at 50 mm* | ±0.25 in |
| Power supply | 5 VDC from the medical device | |
| Life cycle | 500,000 compressions | |
| Protection class | IP66 (Dustproof & protected against powerful water jets) | |
| * Lab conditions | | |

Tab. 8-33 Technical Specifications - General primeCPR feedback sensor

Charging bracket and the adapter charging bracket (accessories)

| Dimensions | | |
|---|---|---|
| Height | 20 cm | 7.87 in |
| Width | 23 cm | 9.06 in |
| Depth | 7 cm | 2.76 in |
| | Adapter charging bracket: 9.5 cm | Adapter charging bracket: 3.74 in |

Tab. 8-34 Technical Specifications - Charging brackets - Dimensions

| Environmental requirements | | |
|---|---|---|
| Environmental temperature | -20 °C to +55 °C | -4 °F to +131 °F |
| Relative humidity | ≤95 % (without condensation) | |
| Protection | IPx2 | |

Tab. 8-35 Technical Specifications Charging brackets - Environmental requirements

| Environmental requirements | | |
|---|---|---|
| Storage temperature | -20 °C to +65 °C | -4 °F to +149 °F |

Tab. 8-36 Technical Specifications Charging brackets - Storage conditions

| Energy management and power consumption | | |
|---|---|---|
| External power supply,<br>On-board power supply 12 V | Approved input voltage range | ⩾10 V |
| | | Typical 12 V |
| | | ⩽14 V |
| | Protection | 15 A, time lag fuse (T)<br>Additional consumers on-board not taken into account |
| AC adapter corpuls3/corpuls1 | Output current, maximum | 9 A |
| | Protection | 6.3 A, time lag fuse (T) |
| | Range of output voltage | ⩾10 V |
| | | Typical 12 V |
| | | ⩽14 V |
| | Protection class against electrical shock when operated via mains charger (according to IEC 60601-1) | I |

Tab. 8-37 Technical Specifications Charging brackets - Energy Management

# IX Major performance characteristics

The essential performance characteristics of the corpuls1 and its optional accessories are:

- Defibrillation, synchronous cardioversion and AED therapy decision
- ECG monitoring, heart rate and alarms
- SpO2 monitoring, pulse rate and alarms
- Mounting in vehicle

# X Guidelines and Manufacturer's Declaration

| Electromagnetic emission | | |
|---|---|---|
| The corpuls1 is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the corpuls1 is used in such an environment. | | |
| **Emission measurements** | **Compliance** | **Electromagnetic environment - guidelines** |
| HF emissions in accordance with CISPR 11 | Group 1<br>Class B | The corpuls1 uses HF energy only for its internal function. The HF emission is very low. Therefore the risk of the corpuls1 impairing the function of adjacent electronic devices is unlikely. According to IEC 60601-1-2, the corpuls1 is intended for use in areas of home health care and in professional healthcare institutions and those which are directly connected to the public mains supply. Furthermore, the corpuls1 is suitable for use in vehicles, aeroplanes and on ships. |
| HF emissions in accordance with CISPR 25 | ECE R-10 | |
| Emission of harmonic oscillations in accordance with IEC 61000-3-2 | Only to be used with tabletop AC adapter Class A | |
| Voltage fluctuations/flicker in accordance with IEC 61000-3-3 | Only to be used with tabletop AC adapter | |

Tab. 10-38 Electromagnetic emission

| Electromagnetic interference immunity | | | |
|---|---|---|---|
| The corpuls1 is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the corpuls1 is used in such an environment. | | | |
| **Interference immunity tests** | **IEC 60601 test level** | **Compliance level** | **Electromagnetic environment - guidelines** |
| Transient electrical interference/bursts at supply cables in accordance with ISO 7637-2 | Pulse 1, 2, 3, 4<br>limit according to ECE R-10<br>and EN 50498 | Test Level III | |
| Electrostatic discharge (ESD) in accordance with IEC 61000-4-2 | ±8 kV contact discharge<br>±15 kV aerial discharge | ±8 kV contact discharge<br>±15 kV aerial discharge | Floors should be made of wood, concrete or metal or be covered with ceramic tiles. If the floor is covered with synthetic material, the relative humidity should be at least 30 %. |
| Rapid transient electrical interference/bursts in accordance with IEC 61000-4-4 | ±2 kV for mains leads<br>±1 kV for signal<br>Input Parts (SIPS)/<br>Signal Output Parts (SOPS) | ±2 kV for mains leads<br>±1 kV for signal<br>Input Parts (SIPS)/<br>Signal Output Parts (SOPS) | The quality of the power supply should correspond to that of a typical business or hospital environment. |
| Surges according to IEC 61000-4-5 | ±1 kV line to line<br>±2 kV line to ground | ±1 kV line to line<br>±2 kV line to ground | The quality of the power supply should correspond to that of a typical business or hospital environment. |
| Voltage dips, brief interruptions and fluctuations in the power supply in accordance with IEC 61000-4-11<br>NOTE: Only to be used with tabletop AC adapter | 0 % $U_T$ for ½ period<br>40 % $U_T$ for 6 periods<br>70 % $U_T$ for 30 periods<br>0 % $U_T$ for 300 periods | 0 % $U_T$ for ½ period<br>40 % $U_T$ for 6 periods<br>70 % $U_T$ for 30 periods<br>0 % $U_T$ for 300 periods | The corpuls1 is always operated with a battery buffer. The user must make sure that the battery in the device is always adequately charged. |
| Magnetic field of the supply frequency (50/60 Hz) in accordance with IEC 61000-4-8 | 30 A/m | 30 A/m 50 Hz | Do not operate the corpuls1 near an activated MRI unit (magnetic resonance imaging). |

| Electromagnetic interference immunity |
|---|
| Note: $U_T$ is the mains alternating voltage before application of the test level. |

Tab. 10-39 Electromagnetic interference immunity part 1

| Electromagnetic interference immunity | | | |
|---|---|---|---|
| The corpuls1 is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the corpuls1 is used in such an environment. | | | |
| **Interference immunity tests** | **IEC 60601 test level** | **Compliance level** | Electromagnetic environment - guidelines |
| Conducted HF interference according to IEC 61000-4-6 | 3 $V_{eff}$<br>outside the ISM- and amateur radio frequency bands [a] | 3 $V_{eff}$<br>outside the ISM- and amateur radio frequency bands [a] | d = 1.2√P |
| | 6 $V_{eff}$<br>outside the ISM- and amateur radio frequency bands [a] | 6 $V_{eff}$<br>outside the ISM- and amateur radio frequency bands [a] | |
| Radiated HF interference according to IEC 61000-4-3 | 10 V/m<br>80 MHz to 2.5 GHz | 3 V/m | ECG monitor:<br>d = 4.0√P for 80 MHz to 800 MHz<br>d = 7.7√P for 800 MHz to 2.5 GHz |
| | | 20 V/m | Pulse oximetry monitor:<br>d = 4.0√P for 80 MHz to 800 MHz<br>d = 7.7√P for 800 MHz to 2.5 GHz |
| | | 10 V/m | Defibrillator: no unintentional change in condition<br>d = 1.2√P for 80 MHz to 800 MHz<br>d = 2.3√P for 800 MHz to 2.5 GHz |
| | | 20 V/m | Defibrillator: no unintentional energy release<br>d = 0.6√P for 80 MHz to 800 MHz<br>d = 1.2√P for 800 MHz to 2.5 GHz<br>P being the maximum nominal output of the transmitter in watts (W) in accordance with the transmitter manufacturer's specifications and d being the recommended protection distance in metres (m).[b]<br>The field strength of stationary radio transmitters should be lower than the ambient level c for all frequencies according to an on-site test.[d]<br>Interference is possible in the vicinity of devices that bear the following pictorial symbol:  |
| | 27 V/m | 27 V/m | 380 MHz to 490 MHz<br>TETRA 400 |

| Electromagnetic interference immunity | | | |
|---|---|---|---|
| | 28 V/m | 28 V/m | 430 MHz to 470 MHz<br>GMRS 460, FRS 460 |
| | 9 V/m | 9 V/m | 704 MHz to 787 MHz<br>LTE Band 13, 17 |
| | 28 V/m | 28 V/m | 800 MHz to 960 MHz<br>GSM 800/900, TETRA 800, iDEN 820,<br>CDMA 850, LTE Band 5 |
| | 28 V/m | 28 V/m | 1700 MHz to 1990 MHz<br>GSM 1800, CDMA 1900, GSM 1900, DECT,<br>LTE Band 1, 3, 4, 25; UMTS |
| | 28 V/m | 28 V/m | 2400 MHz to 2570 MHz<br>Bluetooth, WLAN 802.11 b/g/n,<br>RFID 2450, LTE Band 7 |
| | 9 V/m | 9 V/m | 5100 MHz to 5800 MHz<br>WLAN 802.11 a/n |

**Comment 1**

At 80 MHz to 800 MHz the higher frequency range applies.

**Comment 2**

These guidelines may not be applicable in all cases. Propagation of electromagnetic variables is influenced by absorption and reflection via buildings, objects and people.

[a] The ISM frequency bands (for industrial, scientific and medical applications between 150 kHz and 80 MHz) are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz and 40.66 MHz to 40.70 MHz.

[b] The compliance levels in the ISM frequency bands between 150 kHz to 80 MHz and in the frequency range of 80 MHz to 2.5 GHz are intended to reduce the likelihood that portable/mobile communication devices will be able to cause interference if they are unintentionally brought into the patient area. For this reason, the additional factor 10/3 is applied in calculating the recommended protection distances in these frequency ranges.

[c] The magnetic force of stationary transmitters, such as base stations of mobile telephones and mobile terrestrial radio devices, amateur radio stations, AM and FM radio and television transmitter can theoretically not be determined in advance. To establish the electromagnetic environment with regard to stationary transmitters, a study of the location should be considered. If the measured field strength at the location at which the device is used exceeds the above mentioned compliance level, the device must be observed to verify function as intended. If unusual performance characteristics are observed, additional measures may be required, such as e. g. a modified orientation or another location for the device.

[d] Above the frequency range of 150 kHz to 80 MHz the field strength must be less than 3 V/m.

Tab. 10-40 Electromagnetic interference immunity part 2

| Recommended protection distances between portable/mobile HF communication devices and the corpuls1 | | | | |
|---|---|---|---|---|
| The corpuls1 is intended for operation in an electromagnetic environment in which radiated HF interference is controlled. The operator or the user of the corpuls1 can help to prevent electromagnetic interference by observing minimum distances between portable/mobile HF communication devices (transmitters) and the corpuls1 as recommended below in accordance with the maximum output of the communication device. | | | | |
| **Nominal output of the transmitter** in W | **Protection distance in accordance with transmission frequency** in m | | | |
| | 150 kHz to 80 MHz<br>outside the ISM bands<br>d = 1.2√P | 150 kHz to 80 MHz<br>in the ISM bands<br>d = 4.0√P | When used as a monitor | |
| | | | 80 MHz to 800 MHz<br>d = 4.0√P | 800 MHz to 2.5 GHz<br>d = 7.7√P |

| Recommended protection distances between portable/mobile HF communication devices and the corpuls1 | | | | |
|---|---|---|---|---|
| 0.01 | 0.12 | 0.4 | 0.4 | 0.77 |
| 0.1 | 0.38 | 1.3 | 1.3 | 2.4 |
| 1 | 1.2 | 4.0 | 4.0 | 7.7 |
| 10 | 3.8 | 13 | 13 | 24 |
| 100 | 12 | 40 | 40 | 77 |
| | **When used as a defibrillator** | | **Defibrillator: no unintentional energy release** | |
| | 80 MHz to 800 MHz<br>d = 1.2√P | 800 MHz to 2.5 GHz<br>d = 2.7√P | 80 MHz to 800 MHz<br>d = 0.6√P | 800 MHz to 2.5 GHz<br>d = 1.2√P |
| 0.01 | 0.12 | 0.27 | 0.06 | 0.12 |
| 0.1 | 0.38 | 066 | 0.15 | 0.38 |
| 1 | 1.2 | 2.7 | 0.6 | 1.2 |
| 10 | 3.8 | 6.6 | 1.5 | 3.8 |
| 100 | 12 | 27 | 6.0 | 12 |
| For transmitters, whose nominal output is not indicated in the table above, the distance can be determined using the equation which corresponds to the respective column. P is the nominal output of the transmitter in watts (W) in accordance with the transmitter manufacturer's specification. | | | | |
| **Comment 1**<br>The ISM bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz and 40.66 MHz to 40.70 MHz. | | | | |
| **Comment 2**<br>To calculate the recommended protection distance of transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range between 80 MHz to 800 GHz an additional factor of 10/3 is used to reduce the likelihood that a portable/mobile communications device brought into the patient area will result in interference. | | | | |
| **Comment 3**<br>These guidelines may not apply in all situations. Propagation of electromagnetic waves is influenced by absorption and reflection via buildings, objects and people.<br>Subject to technical modifications. | | | | |

Tab. 10-41 Recommended protection distances

# XI Factory Settings

Menu item ***Alarms***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> Limits* (Adult, Child, Neonate) | HR 1/min | ↓ | 50 |
| | | ↑ | 120 |
| | SpO2 % | ↓ | 90 |
| | | ↑ | off |
| | PI % | ↓ | off |
| | | ↑ | off |
| | PR 1/min | ↓ | 50 |
| | | ↑ | 120 |
| | SpCO % | ↓ | off |
| | | ↑ | 10 |
| | SpHb g/dl | ↓ | 10.0 |
| | | ↑ | 17.0 |
| | SpMet % | ↓ | off |
| | | ↑ | 3 |
| *> Auto limits* | HR 1/min | ↓ | 50 |
| | | ↑ | 120 |
| | SpO2% | ↓ | 90 |
| | | ↑ | off |
| | PI % | ↓ | off |
| | | ↑ | off |
| | PR 1/min | ↓ | 50 |
| | | ↑ | 120 |
| | SpCO % | ↓ | off |
| | | ↑ | 10 |
| | SpHb g/dl | ↓ | 10.0 |
| | | ↑ | 17.0 |
| | SpMet % | ↓ | off |
| | | ↑ | 3 |
| *> Settings* | Settings (only user OPERATOR) | Suspension | Off |
| | | Reminder | ☒ |
| | | Silence | Not active |
| | Alarm | Volume | 5 |

Tab. 11-42 Factory Settings - Alarms

Menu item ***Signals***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> Curves* | ECG | DE | ☐ |
| | | I | ☐ |
| | | II | ☐ |
| | | Auto II/DE | ☒ |
| | | III | ☐ |
| | | aVR | ☐ |
| | | aVL | ☐ |
| | | aVF | ☐ |
| | | -aVR | ☐ |
| | Pulse oximetry | Pleth | ☒ |
| | CPR | CPR | ☐ |
| *> Parameters* | ECG | HR | ☒ |
| | Pulse oximetry | SPO2 | ☒ |
| | | PR | ☐ |
| | | PI | ☐ |
| | | SpCO | ☐ |
| | | SpHb | ☐ |
| | | SpMet | ☐ |
| | Display | Item | Left |
| | Trend | Interval | 10 s |
| | CPR | CPR rate | ☐ |
| *> Views* | View 1 | - | Curves: ECG (DEauto), Pleth<br>Param.: HR, SpO2, PR, PI<br>Position: at the top |
| | View 2 | - | Curves: ECG (DEauto), Pleth<br>Param.: HR, SpO2<br>Position: right |
| | View 3 | - | Curves: ECG (DEauto, aVL), Pleth<br>Param.: HR, SpO2<br>Position: left |
| | View 4 | - | Curves: ECG (DEauto), Pleth<br>Param.: HR, SpO2, PI<br>Position: left |

Tab. 11-43 Factory Settings - Signals

Menu item ***ECG***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| > ***Settings*** | Display | Speed | 25 mm/s |
| | | Amplitude | x1 |
| | | QRS marker | ☒ |
| | QRS tone | Enabled | ☒ |
| | | Dynamic | ☐ |
| | | Volume | 4 |
| > ***Filter*** (user OPERATOR only) | Filter | Low pass | 25 Hz |
| | | High pass | 0.5 Hz |

Tab. 11-44 Factory Settings - ECG

Menu item ***Defib***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> **Settings*** | Audio | Recording | ☐ |
| | Starting mode | | ☐ |
| *> **Metronome*** | Audio | Compr. tone | 10 |
| | | Vent. tone | 10 |
| | Autostart metr. | AED | Off |
| | | Man. Defib | Off |
| | Adult (user OPERATOR only) | Compress. | 100 /min |
| | | Vent. 30:2 | 4 s |
| | Child (user OPERATOR only) | Compress. | 100 /min |
| | | Vent. 15:2 | 4 s |
| | | Vent. 30:2 | 4 s |
| AED (user OPERATOR only) | Audio AAM | AAM | ☒ |
| | View | VP | none |
| | | Additional Curve | III |
| | Pre-shock CPR | Compressions | none |
| | | Metronome | ☐ |
| | Algorithm | CPR | 120 s |
| | Auto Energy | Adult | 200 J |
| | | Child | 100 J |
| | | Neonate | 50 J |
| | | Locked | ☒ |
| *> **Manual*** (user OPERATOR only) | Audio | Ready-signal | ☒ |
| | View | VP | HR |
| | | Additional Curve | III |
| | Auto Energy | Adult | 200 J |
| | | Child | 100 J |
| | | Neonate | 50 J |
| *> **CPR*** | Audio AAM | Feedback AED | 10 |
| | | Feedback Manual | 10 |
| | | Feedback Monitor | 10 |
| | | Fully release | ☒ |
| | Application note | Show note | ☒ |
| | CPR depth | Unit | cm |

Tab. 11-45 Factory Settings - Defib

The CPR compression depth is fixedly implemented and therefore corresponds to the factory settings: 5.0 cm to 6.0 cm / 2.0 in to 2.4 in

Menu item ***Pacer***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> **Pacer*** | View | VP | HR |
| | | Additional Curve | III |

Tab. 11-46 Factory Settings - Pacer

Menu item ***Oximetry***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> **Settings*** | Display | Speed | 25 mm/s |
| | Settings | FastSat | ☐ |
| | | Averaging time | 8 s |
| | | Sensitivity | Normal |
| | Pulse tone | Enabled | ☒ |
| | | Dynamic | ☐ |
| | | Volume | 4 |
| | SpHb | Unit | g/dl |

Tab. 11-47 Factory Settings - Oximetry

Menu item ***System***

| Submenu item | List | List box | Settings value |
|---|---|---|---|
| *> **Settings*** | Language (user OPERATOR only) | - | English |
| | Mains filter (user OPERATOR only) | Mains freq. | 50 Hz |
| | Display | Brightness | 8 |
| | | Dim mode | 6 |
| | | autoDim | 10 min |
| | | Colours | Default |
| | Keyboard | Backlight | ☒ |
| | Device start (user OPERATOR only) | Mode | Monitoring |
| | | Patient class | Adult |
| | | Start user | Man. Defib. |

Tab. 11-48 Factory Settings - System

# XII Checklist Functional test

The checklist contains the test procedures of the daily functional check (see 14 Functional Test and Maintenance on page 162). The checklist is meant as a tool to document the extended visual inspection and as a suggested complement for the local documentation.

If all the extended visual inspection achieve the correct result, the extended visual inspection is successful. If the extended visual inspection has been successful, mark the column "OK/NOK" with OK. If the extended visual inspection has failed, mark the column "OK/NOK" with NOK. If necessary, there is some space for remarks at the end of the checklist.

| Checklist Functional test | | | |
|---|---|---|---|
| Date: | | Performed by: | |
| Shift: | | Device name/serial number and software version: | |
| Location or department: | | | |
| Rescue equipment: | | | |

| Visual check | OK/NOK | Visual check | OK/NOK |
|---|---|---|---|
| corPatch easy electrodes (disposable) present and not expired | | CPR Feedback sensor and intermediate cable present and not expired | |
| ECG cables (4-pole) | | Shock paddles (in reserve) | |
| Pulse oximetry sensor and intermediate cable present and not expired | | | |

| Functional Test | OK/NOK | Functional Test | OK/NOK |
|---|---|---|---|
| Switch on the corpuls1. | | CPR Feedback | |
| Self test switch on | | SD Card | |
| Defibrillator/Pacer:<br>(Shock with **Testload** or **Testbox** or **corpuls simulator**) | | Battery | |
| ECG monitoring (**Testbox** or **corpuls simulator**) | | Switch off the corpuls1. | |
| Pulse Oximetry Monitoring | | | |

| Annotations |
|---|
| |

Tab. 12-49 Checklist Functional test

# XIII Masimo Safety Information

**Sensor general**

- This equipment has been tested and found to comply with the limits for medical devices to the EN 60601-1-2: 2002, Medical Device Directive 93/42/EEC. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other devices, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving device.
  - Increase the distance between the devices.
  - Consult the manufacturer for help.
- Before use, carefully read the user manual of the sensor.
- Do not use damaged sensors or patient cables. Do not use a sensor or patient cable with exposed optical or electrical components.
- Do not attempt to reprocess, recondition or recycle any pulse oximetry sensors or patient cables as these processes may damage the electrical components, potentially leading to harm.
- Do not modify or alter the pulse oximetry sensor in any way. Alterations or modification may affect performance and/or accuracy.
- Unless otherwise specified, do not sterilise sensors or patient cables by irradiation, steam, autoclave or ethylene oxide. See the cleaning instructions in the user manual for the pulse oximetry reuseable sensors.
- Interfering Substances: Dyes or any substance containing dyes that change usual blood pigmentation may cause erroneous readings.
- To avoid cross contamination only use single use sensors on the same patient.

**Masimo sensor**

*Masimo SET-Technology-specific conditions*

- The Masimo SET Technology with Masimo sensors has been validated for no motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70 % to 100 % SpO2 against a laboratory CO oximeter and ECG monitor. This variation equals ±1 standard deviation and encompasses 68 % of the population.
- The Masimo SET Technology with Masimo sensors has been validated for motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70 % to 100 % SpO2 against a laboratory CO oximeter and ECG monitor. Rubbing and tapping motions were performed at 2 Hz to 4 Hz at an amplitude of 1 cm to 2 cm and a non-repetitive motion between 1 Hz to 5 Hz at an amplitude of 2 cm to 3 cm. This variation equals ±1 standard deviation and encompasses 68 % of the population.
- The Masimo SET technology has been validated for low perfusion accuracy in bench top testing against a Biotek Index 2 simulator and Masimo's simulator with signal strengths of greater than 0.02 % and transmission of greater than 5 % for saturations ranging from 70 % to 100 %. This variation equals ±1 standard deviation and encompasses 68 % of the population.
- The Masimo SET technology with Masimo sensors has been validated for pulse rate accuracy for the range of 25 to 240 bpm in bench top testing against a Biotek Index 2 simulator. This variation equals ±1 standard deviation and encompasses 68 % of the population.
- SpHb accuracy has been validated on healthy adult male and female volunteers and on surgical patients with light to dark skin pigmentation in the range of 8 to 17 g/dl SpHb against a laboratory CO-oximeter. This variation equals ±1 standard deviation and encompasses 68 % of the population. The SpHb accuracy has not been validated with motion or low perfusion.

*Placement Sensor*

- Tissue damage can be caused by incorrect application or use of a sensor, for example by wrapping the sensor too tightly. Inspect the measuring site as directed in the user manual of the sensor to ensure skin integrity and correct positioning and adhesion of the sensor.
- Avoid placing the sensor on any extremity with an arterial catheter or blood pressure cuff.
- Exercise caution when applying a sensor to a measuring site with compromised skin integrity. Applying tape or pressure to such a site may reduce circulation and/or cause further skin deterioration.
- Do not use tape to fasten the sensor at the measuring site. Can impair perfusion and lead to inaccurate readings. Use of additional tape can cause skin damage or damage the sensor.
- If the sensor is wrapped to tightly or supplemental tape is used, venous congestion/pulsations may occur causing erroneous readings.
- Circulation distal to the measuring site should be checked routinely.

*Selecting vital parameters*

- Pulse rate measurement is based on the optical detection of a peripheral flow pulse and therefore may not detect certain arrhythmias. The pulse oximeter should not be used as a replacement or substitute for ECG based arrhythmia analysis.
- The pulsations from intra-aortic balloon support can be additive to the pulse rate on the pulse oximeter pulse rate display. Verify patient's pulse rate against the ECG heart rate.
- Venous pulsations may cause erroneous low readings e. g. in case of tricuspid valve regurgitation.
- Loss of pulse signal can occur when:
  - The sensor is too tight.
  - The patient has hypotension, severe vasoconstriction, severe anaemia, or hypothermia.
  - There is arterial occlusion proximal to the sensor.
  - The patient is in cardiac arrest or is in shock.
- Venous congestion may cause under reading of actual arterial oxygen saturation. Assure proper venous outflow from measuring site. Sensor should not be located below heart level, e. g. sensor on hand of a patient in a bed with arm dangling to the floor.
- A pulse CO-Oximeter should be considered an early warning device. If a trend towards patient hypoxaemia is indicated, blood samples should be analysed by laboratory instruments to completely understand the patient's condition.
- For measurements of high or low SpHb readings, blood samples should be analysed by laboratory instruments to completely understand the patient's condition.
- $SpO_2$ is empirically calibrated to functional arterial oxygen saturation in healthy adult volunteers with normal levels of carboxyhaemoglobin (COHb) and methaemoglobin (MetHb). A pulse oximeter cannot measure elevated levels of carboxyhaemoglobin (COHb) or methaemoglobin (MetHb). Increases in either carboxyhaemoglobin- (COHb) or methaemoglobin- (MetHb) levels will affect the accuracy of the $SpO_2$ measurement.
  - For increased COHb: COHb levels above normal tend to increase the level of $SpO_2$. The level of increase is approximately equal to the amount of COHb that is present. High levels of COHb may occur with a seemingly normal $SpO_2$ levels. When elevated levels of COHb are suspected, laboratory analysis (CO pulse oximetry) of a blood sample should be performed.
  - For increased MetHb: the $SpO_2$ levels may be decreased by levels of MetHb of up to approx.10 % to 15 %. At higher levels of MetHb, the $SpO_2$ level may tend to read in the low to mid 80s. When elevated levels of MetHb are suspected, laboratory analysis (CO pulse oximetry) of a blood sample should be performed.
- Haemoglobin synthesis disorders may cause erroneous SpHb readings.
- Elevated levels of total bilirubin may lead to inaccurate $SpO_2$, SpMet, SpCO and SpHb readings.
- Motion artifacts may lead to inaccurate readings of SpMet, SpCO, SpHb, and SpOC.
- Severe anaemia may cause faulty $SpO_2$ readings.
- Very low arterial Oxygen Saturation ($SpO_2$) levels may cause inaccurate SpCO and SpMet measurements.
- With very low perfusion at the measuring site, the readings may read lower than core arterial oxygen saturation.
- Misapplied sensors or sensors that are partially dislodged may cause either false-elevated or false-reduced readings of the actual arterial oxygen saturation.
- High-intensity extreme lights (including pulsating strobe lights) directed on the sensor may not allow the CO-pulse oximeter to obtain readings.
- The CO-pulse oximeter can be used during defibrillation, but the readings may be inaccurate for up to 20 s.
- The CO-pulse oximeter is NOT intended for use as an apnea monitor.
- If the CO pulse oximeter is used during a full body irradiation, keep the sensor outside the irradiation field. If the sensor is exposed to the irradiation, the reading might be inaccurate or the unit might read zero for the duration of the active irradiation period.
- A functional tester cannot be used to assess the accuracy of the Pulse CO-Oximeter.

# XIV List of Tables

# XV List of Illustrations

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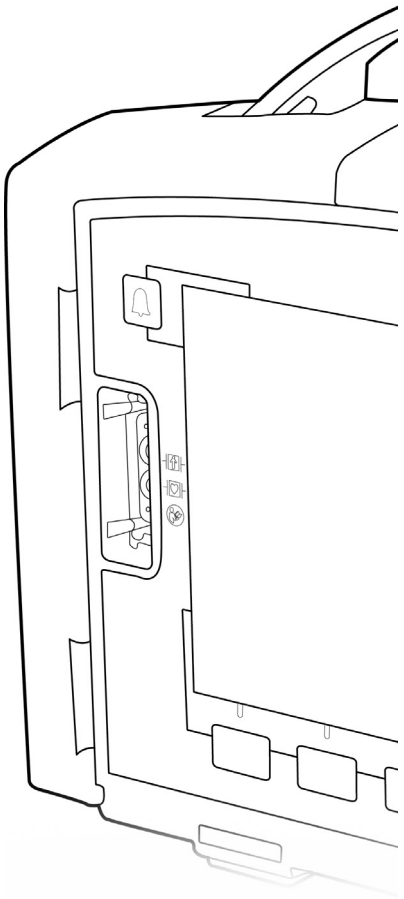

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USER MANUAL