corpuls cpr

User Manual

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User Manual **corpuls cpr**

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If a serious incident pertaining to a device has occurred, this has to be reported to the manufacturer and the competent authorities of the member country, in which the user and/or patient has residence.

Further technical information can be obtained from the manufacturer.

Versions of the User Manual

Issue	Date	Version of User manual	Version of Software
1	05/2016	1.0	cCPR_1.0.x
2	02/2017	1.0 A	cCPR_1.0.x
3	03/2018	1.0 B	cCPR_1.0.x
4	3/2019	1.1 A	cCPR_1.1.x

Service Address

For questions, please contact authorised sales and service partners.

Information on authorised sales and service partners can be found at:

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Table of Contents

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1 Evaluation Software

The software for evaluation of mission data **corpuls.web REVIEW** is available free of charge with every device. The software can be downloaded at .

2 Performance Description

2.1 Intended Purpose

The **corpuls cpr** is a device for electro-mechanical chest compressions within the framework of a cardio-pulmonary resuscitation. Intended use is by professional medical staff on closed thorax patients only.

2.2 Intended Use

The following points must absolutely be observed to comply with the intended use:

- The user must have read and understood the user manual.
- The user has professional medical training.
- The user is trained in basic and advanced resuscitation measures.
- Users have been trained in handling the **corpuls cpr**.
- The **corpuls cpr** is complete, functional and in perfect technical condition.
- There are no technical faults and high priority alarms.
- The user must supervise the **corpuls cpr** during therapy in order to be able to intervene in case of error and to continue the therapy manually.
- The user only uses approved accessories, spare parts and consumables.
- The user is storing and transporting the **corpuls cpr** exclusively in the pertaining carrying bag.
- The user stores, transports and operates the **corpuls cpr** exclusively in line with the prescribed specifications for storage, transport and operation.

2.3 Non Intended Use

- Do not operate the **corpuls cpr** without a stamp for therapy. Can lead to severe injuries of the patient.
- Do not operate the **corpuls cpr** in combination with CPR feedback sensors. Erroneous CPR feedback possible.

2.4 Major Performance Characteristics

The **corpuls cpr** performs therapy with the configured compression depth and -frequency. If a system error occurs, the **corpuls cpr** stops the therapy. The arm moves to a neutral position. The user has to continue the therapy manually. A loss of the major performance characteristics can lead to injury of the patient due to the indefinable status of the arm.

2.5 Areas of Application

The **corpuls cpr** is intended for use in areas of home health care and in professional healthcare institutions. Among these are:

- EMS and patient transport vehicles.
- Pre-hospital and intra-hospital emergency care environments (inside and outside of closed rooms).

2.6 Indication

Indicated patients are adults and children aged eight years and older with circulatory arrest on which a manual cardio-pulmonary resuscitation can be performed.

2.7 Contraindication

Contraindicated are:

- Patients whose body measurements exceed the permissible limits of the **corpuls cpr** (refer to Table A-1 Technical specifications - patient parameters on page 131).
- Patients on which the **corpuls cpr** cannot be positioned safely and correctly on the thorax.
- Patients with existing pregnancy.
- Patients with injuries that lead to an instability of the thorax and thus prevent effective cardiac massage.
- Patients with injuries that are not compatible with life.

3 Safety

This chapter contains safety-relevant information that has to be observed when operating the **corpuls cpr**.

3.1 Safety Instructions for Users

Read the notices and warnings and follow the instructions. These contain information necessary for safe and disruption-free operation of the device, and help to prevent injuries to users and patients.

WARNING!

Wrong handling due to failure to read the user manual!

Can lead to user and patient injury.

► Read the user manual of the device.

CAUTION!

Neglect of supervisory duty during therapy!

Can lead to injuries of the patient.

► Supervise the device during therapy.

► In case of error stop device and continue therapy manually.

CAUTION!

Mutual electromagnetic influence from medical devices and systems stacked over or operated near each other.

Can lead to failure of the arm.

► Avoid operation in direct proximity to other medical devices.

► Closely monitor medical devices that are operated in direct proximity to each other.

WARNING!

Risk of compromising accompanying therapies due to damage of accessories!

Can impair the effectiveness of accompanying therapies and cause those therapies to be terminated.

Can severely compromise patient health.

► Ensure that no device parts related to accompanying therapies such as e. g. IV lines, ventilation tubes, defibrillation electrodes and cables are located under the stamp.

3.2 Warning- and Notice Labels on the Device

The following table describes the warning and notice labels on the **corpuls cpr**.

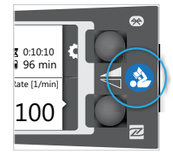
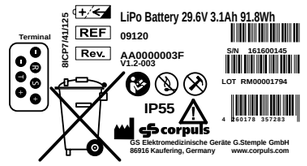
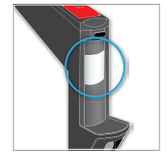
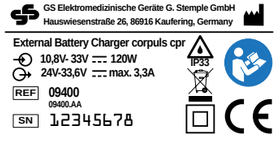
Warning-/Notice labels	Description	Location on the device
	Mind the user manual.	
	Rating plate for the **corpuls cpr** battery.	
	Rating plate for the **corpuls cpr** arm.	
	Rating plate for the external battery charger.	

Table 3-1 Warning- and notice labels on the corpuls cpr

4 Directions for Users

This chapter includes all information that must be observed when using this user manual.

4.1 Requirements for the User

In order to use the **corpuls cpr**, users must meet the following requirements (amongst others):

- Users must be specialist medical personnel.
- Users must be trained in basic and advanced resuscitation measures.
- Users have been trained in handling the **corpuls cpr**. Applicable national laws and guidelines must be observed during training on the device.

Applicable regional and/or international guidelines on cardio-pulmonary resuscitation (CPR) must be observed when operating the corpuls cpr.

4.2 User 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 it accessories.

4.3 Use of this Manual

The user manual has been compiled to enable better understanding of the **corpuls cpr**. The user must read through the user manual from beginning to end.

The user manual provides users with the following information:

- Safe and disruption-free operation of the **corpuls cpr**.
- Treatment of the patient with **corpuls cpr**.
- Maintenance of the **corpuls cpr**.
- Troubleshooting.

In addition to this user manual, the 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.

4.3.1 Typographic Conventions

The following typographic conventions apply in this user manual:

Typographic conventions	Description
Product name	Indicates the product name.
[Softkey]	Indicates a softkey.
"Menu item"	Indicates a menu item.
► "Submenu item"	Indicates a submenu item.
Note	Indicates an explanatory message.
"Alarm"	Indicates an alarm message.

4.3.2 Depiction of Warnings and Notices

Warnings and notes illustrate potential sources of danger when using **corpuls cpr** and refer to important information.

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!

Extremely dangerous situation which ***will*** result in death or severe injuries if the warning is not heeded.

WARNING!

Dangerous situation which ***may*** result in death or severe injuries if the warning is not heeded.

CAUTION!

Dangerous situation which may result in light or moderate injuries if the warning is not heeded.

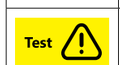
NOTICE!

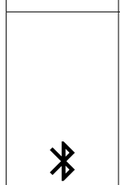
Situation which may result in material- or environmental damage if the warning is not heeded.

Notices either point users to important information that must be observed when executing a step, or provide additional information on a particular subject.

4.4 Symbols

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

Symbol	Designation	Description
	"System error"	Symbol on the display of the arm. The arm signals the alarm "System error".
	"Malfunction"	Symbol on the display of the arm. The arm signals the alarm "Malfunction".
	Therapy stopped for longer than 8 s	Symbol on the display of the arm. The arm signals the alarm "Therapy stopped for longer than 8 s".
	"Battery charging status very low"	Symbol on the display of the arm. The arm signals the alarm "Battery charging status very low".
	"Battery not ready for use"	Symbol on the display of the arm. The arm signals the alarm "Battery not ready for use" The battery is defective or empty.
	"Temperature of the battery very high"	Symbol on the display of the arm. The arm signals the alarm "Temperature of the battery very high".
	"Open the locking lever"	Symbol on the display of the arm. The arm signals the alarm "Open the locking lever".
	"Close the locking lever"	Symbol on the display of the arm. The arm signals the alarm "Close the locking lever".
	"Arm too low"	Symbol on the display of the arm. The arm signals the alarm "Arm too low".
	"Temperature of the arm very high"	Symbol on the display of the arm. The arm signals the alarm "Temperature of the arm very high".
	"Battery charging status low"	Symbol on the display of the arm. The arm signals the alarm "Battery charging status low".
	"Battery life"	Symbol on the display of the arm. The arm signals the alarm "Battery life".
	"Temperature of the battery high"	Symbol on the display of the arm. The arm signals the alarm "Temperature of the battery high".
	Customer service for battery	Symbol on the display of the arm. The arm signals the alarm "Customer service for battery".
	"Self-test failed"	Symbol on the display of the arm. The arm signals the alarm "Self-test failed".
	"RTC error"	Symbol on the display of the arm. The arm signals the alarm "RTC error".
	"Therapy stopped"	Symbol on the display of the arm. The arm signals the alarm "Therapy stopped".
	"Arm too high"	Symbol on the display of the arm. The arm signals the alarm "Arm too high".

Symbol	Designation	Description
	"Temperature of the arm high"	Symbol on the display of the arm. The arm signals the alarm "Temperature of the arm high".
	Customer service for battery	Symbol on the display of the arm. The arm signals the alarm Customer service for battery when performing the selftest.
	"SD card error"	Symbol on the display of the arm. The arm signals the alarm "SD card error".
	"SD card almost full"	Symbol on the display of the arm. The arm signals the alarm "SD card almost full".
	"SD card full"	Symbol on the display of the arm. The arm signals the alarm "SD card full".
	**`Customer Service`**	Symbol on the display of the arm. The arm signals the message **`Customer service`**.
	Customer service for battery	Symbol on the display of the arm. The arm signals the message Customer service for battery at the ende of the mission.
	**`Arm too high`**	Symbol on the display of the arm. The arm signals the message **`Arm too high`**.
	**`Arm too low`**	Symbol on the display of the arm. The arm signals the message **`Arm too low`**.
	Open the locking lever	Symbol on the display of the arm. The arm prompts for initial opening of the locking lever.
	Defibrillation proof application part, type BF	Symbol on the stamp. The stamp is a defibrillation proof application part, type BF.
	Bluetooth	Symbol on the keypad The arm has Bluetooth functionality. Symbol on the display of the arm. • Flashing: – The arm is in Discovery mode without a Bluetooth data connection to external systems. • Permanent: – Bluetooth connection to external systems is established.
	NFC	Symbol on the keypad The arm has NFC functionality.

Symbol	Designation	Description
	Read the user manual	Symbol on the keypad Note to read the user manual
	Rotating the screen	Symbol on the keypad The display of the arm can be rotated by means of the two softkeys beside the screen.
	Inverting screen colours	Symbol on the keypad The display of the arm can be inverted by means of the two softkeys beside the screen.
	Bluetooth multi data transmission	Symbol on the display of the arm. There are several Bluetooth connections to external systems. The number indicates the number of connections.
	No Bluetooth	Symbol on the display of the arm. Bluetooth connection not possible.
	Bluetooth data transmission	Symbol on the display of the arm. There is a Bluetooth connection with data transmission.
	Alarm suspension	Symbol on the display of the arm. Next to the alarm line, the arm signals an alarm that can be suspended.
	Alarm suspended	Symbol on the display of the arm. The arm signals a suspended alarm in the display field “Info”.
	Charging	Symbol on the display of the arm. The arm indicates that charging is in progress in the display field “Info”.
	Charging status	Symbol on the display of the arm. The arm signals the charging status in the display field “Info”.
	Do not dispose of in household waste	Symbol in the user manual. Do not dispose of the **corpuls cpr** in household waste.
	Device with protection class II	Symbol on the external battery charger. The device has no protective conductor connection of its own.

Table 4-1 Symbols

5 Device Description

This chapter contains descriptions of the parts of the **corpuls cpr**.

5.1 Main Components of the corpuls cpr

The **corpuls cpr** system is composed of:

- An arm as the central electromechanical unit, with:
  - A stamp in two sizes (refer to 5.3 Stamp on page 12)
  - A battery as a power supply (refer to 5.4 Battery on page 13)
  - An AC adapter for charging the battery (refer to 5.5.1 AC Adapter on page 15)
- One of three board options:
  - Quadboard for in-hospital therapy (refer to 5.5.11 Quadboard on page 22)
  - Recboard for pre-hospital and in-hospital therapy and patient transport (refer to 5.5.7 Recboard on page 19)
  - Scoopboard for pre-hospital and in-hospital therapy and patient transport (refer to 5.5.9 Scoopboard on page 21)

5.2 Components of the Arm

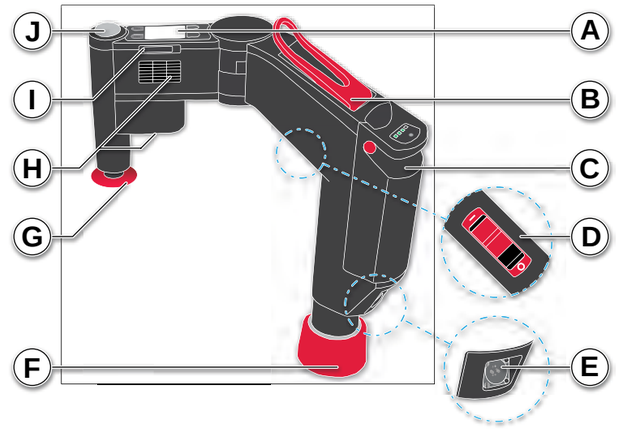


Figure 5-1 Components of the arm

Item	Component	Description
A	Monitor unit with screen and softkeys	The following functions are available: • Control of the functions of the arm (refer to 7 Operation of the Device on page 39). • Display of alarms in the alarm line of the screen (refer to 8 Alarms on page 47). • Status information for Bluetooth connection (refer to 11.1.2 Status Bluetooth on page 77).
B	Locking lever	Immobilisation of the arm.
C	Battery	Supplies power to the arm.
D	ON/OFF switch	Switches the arm on or off.
E	RoPD charging connector	Connects the arm to an external power supply.
F	Bayonet lock	Allows assembly of the arm on one of the boards, e. g. on the Quadboard or the Recboard (refer to 9.3.3 Assembling the Arm on page 61).
G	Stamp	Transfers the compressions of the arm to the thorax of the patient (refer to 5.3 Stamp on page 12).
H	Ventilation slots	Part of the cooling system of the arm.
I	SD card slot	Card slot for the SD card (refer to 5.5.3 SD Card on page 16).
J	**Start/Stop** key	The following functions are available: • Starting therapy (refer to 9.5 Performing Therapy on page 69). • Pausing or stopping therapy (refer to 9.5 Performing Therapy on page 69). • Indicating alarms via the integrated LED (refer to 8 Alarms on page 47).

Table 5-1 Components of the arm

5.3 Stamp

The stamp transfers compression from the arm to the thorax of the patient.

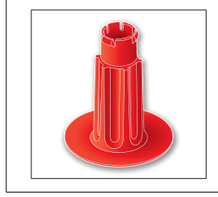
Illustration	Size	Use
	long	For patients with low thorax height and children aged eight years and older.

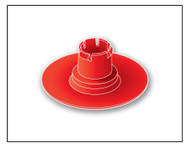
Illustration	Size	Use
	short	For patients with high thorax height.

Table 5-2 Stamp sizes

It is the responsibility of the user to select a stamp of the correct size.

5.4 Battery

A battery supplies power to the arm.

The display unit of the arm shows the remaining running time of the battery in minutes (refer to 7.1 Overview of Display and Softkeys on page 39).

When the arm is connected to the AC adapter, the symbol appears in the display field “Info”. The display shows the current charging status of the battery in percent.

WARNING!

Fire hazard due to short circuit!

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

- ► Defective batteries must be replaced immediately.
- ► In the event of impact or jolts, check the battery for external damage such as breakage of the housing or open adhesive joints.

NOTICE!

Short circuit due to damaged battery!

Can cause damage to the battery and the arm of the **corpuls cpr**.

- ► Defective batteries must be replaced immediately.
- ► In the event of impact or jolts, check the battery for external damage such as breakage of the housing or open adhesive joints.

NOTICE!

Deep discharge of battery due to non-use!

Can cause damage to the battery and can lead to failure of the arm of the **corpuls cpr**.

► Do not store the replacement battery for too long.

► Use the battery and the replacement battery in turns.

► Store the replacement battery in the external battery charger.

A damaged battery is indicated when switching the arm on or off (refer to 8.3.1 Priorities of the Alarms on page 48).

Under the conditions indicated in this user manual (refer to E Technical Specifications on page 131) the battery can stay connected to the mains permanently without any negative effects on the product life span.

5.4.1 Components of the Battery

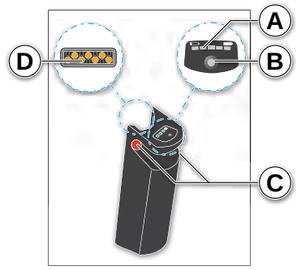


Figure 5-2 Components of the battery

Item	Component	Description
A	Battery display	The following displays are available: • Battery charging status. • Battery charging in progress. • Battery alarms.
B	Key **Charging status**	The following functions are available: • Activates the charging status (refer to 6.2 Check Battery on page 24). • Activates the alarm indication (refer to 8.4 Battery Alarms on page 56).
C	Unlocking buttons (on both sides)	Allow to unlock the battery.
D	Contact field	Electrical contact field to the arm.

Table 5-3 Components of the battery

5.5 Accessories and Options

The following accessories and options are available for the **corpuls cpr** (refer to C Approved Accessories, Spare Parts and Consumables on page 129):

- AC adapter
- DC connector cable
- SD card
- Bluetooth option
- Carrying bag
- Straps
- Scoopboard
- Recboard
- Fixation Ring
- Quadboard
- External charger

If the corpuls cpr is equipped with accessories, the user must mind the information regarding the accessories.

5.5.1 AC Adapter

The AC adapter is an external power supply for the arm and for charging the battery. The AC adapter can be connected to the arm or to the external charger.

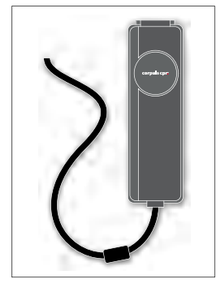


Figure 5-3 AC adapter

Using an AC adapter, the battery can also be charged during therapy. In this case, the battery charging time increases (refer to Table A-7 Technical data - Energy management and power output on page 134).

5.5.2 DC Connector Cable

The DC connector cable is an external power supply for the arm or the external charger and allows to charge the battery via the on-board power supply of emergency vehicles (refer to 6.2.2 Charging the Battery on page 25).

Two types of DC connector cable are available:

- Standard connector (ISO 4165) on RoPD/angled
- RoPD/straight on RoPD/angled (RoPD connection port for assembly in emergency vehicles)

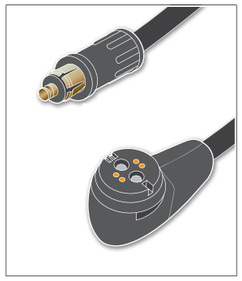


Figure 5-4 DC connector cable for standard connector (ISO 4165) on RoPD/angled

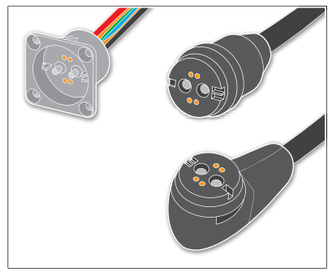


Figure 5-5 DC connector cable for RoPD/straight on RoPD/angled with an RoPD connection port

Using a DC connector, the battery can also be charged during therapy. In this case, the battery charging time increases (refer to Table A-7 Technical data - Energy management and power output on page 134).

For optimum charging performance, the manufacturer recommends using RoPD/straight on RoPD/angled with an RoPD connection port.

5.5.3 SD Card

The SD™ card allows:

- System updates and language packs to be installed (refer to 12.1.14 Update on page 99).
- System configurations to be imported and exported (refer to 12.1.11 Importing the Configuration on page 97).

- Mission data to be recorded.

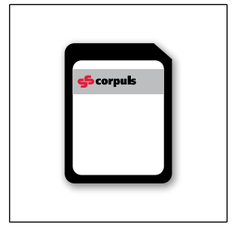


Figure 5-6 SD™ card

5.5.4 Menu item Bluetooth

The option Bluetooth® allows to wirelessly send mission data and the status of the **corpuls cpr** to other devices (e.g. ePCR systems, corpuls3, corpuls.mobile REMOTE).

Establishing and Terminating Connections

If the devices to be connected are paired, the connection is established automatically (refer to 11.1.1 Pairing during a Mission on page 75). If the connection is established, the Bluetooth symbol is displayed permanently (refer to Table 11-1 Bluetooth status on page 78).

If the connection is interrupted, no error message is issued.

Up to two connections are possible at the same time.

If two devices are connected to the corpuls cpr, no further devices can be connected. Existing connections are not affected.

Data Management

The corpuls cpr can transfer data to connected devices. The data can be transferred either continuously or packaged. The data are transferred during the mission.

Active data transmission is indicated in the display by a Bluetooth symbol with two arrows. The manufacturer recommends to keep the corpuls cpr switched on during data transmission, because otherwise the data transmission will be aborted.

If in a running mission data have already been recorded with the corpuls cpr, these data are transferred as soon as there is a connection with another device.

Mission data will be not be deleted after a transmission and are still available on the SD card.

Data transmission can only be used if the Bluetooth option is available and activated and the respective devices have been paired.

5.5.5 Carrying Bag

The **corpuls cpr** and its accessories must be safely transported and stored using the carrying bag. With the backpack straps, the carrying bag can also be used as a backpack.

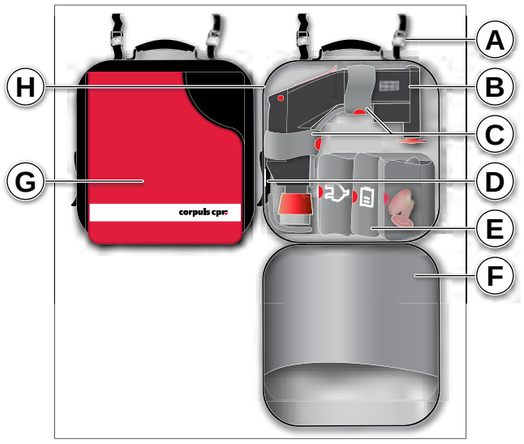


Figure 5-7

Figure 5-8 Carrying Bag

Item	Component	Description
A	Magnetic lock	Allows the carrying bag to be attached to a wall, e. g. in a hospital.
B	Position of the arm	Indicates the position of the stored arm with pre-connected stamp.
C	Velcro fasteners	Immobilise the arm in the carrying bag.
D	Covering flap (on the side)	Allows the battery to be charged in the carrying bag (refer to 6.2.2 Charging the Battery on page 25).
E	Storage compartments for accessories	Allow the accessories to be stored in the carrying bag.

Item	Component	Description
F	Storage compartment	Allows the straps to be stored in the carrying bag.
G	Board storage compartment	Allows the Quadboard or the Recboard to be stored in the carrying bag.
H	Battery viewport	Allows to view the battery.

Table 5-4 Carrying Bag

The manufacturer recommends to carry two of each stamp variant (refer to 5.3 Stamp on page 12).

5.5.6 Straps

The Straps allow to securely position and transport the patient on an appropriate transport device. In combination with the arm, the Recboard or the Scoopboard therapy is also possible during transport (refer to 13.3 Patient Securing System on page 104). With an appropriate head restraint, immobilisation for trauma care is also possible.

5.5.7 Recboard

The Recboard allows:

- To perform in-hospital and pre-hospital therapy with the arm of the **corpuls cpr** (refer to 13.1 Therapy with the Recboard on page 102).
- Transport of the patient while therapy is in progress, if an appropriate carrying device is used (refer to 13 Therapy and Transport with the Recboard on page 102).

The following illustration provides an overview of the components of the Recboard.

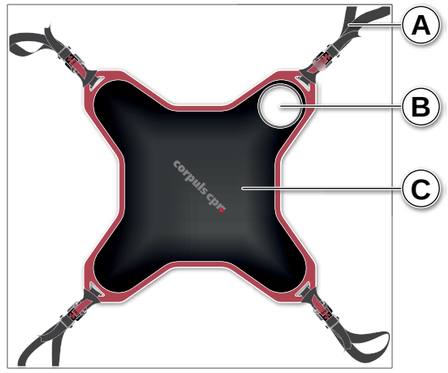


Figure 5-9 Components of the Recboard

Item	Component	Description
A	Attachment straps	The following functions are available: • Allow to secure the Recboard on a carrying device. • Allow to easily lift the Recboard with the patient by means of the hand loops. • Allow to secure the patient on the Recboard by means of the Fixation Ring.
B	Socket for the arm	Allows assembly of the arm on the Recboard.
C	Recboard	Board for therapy with the arm.

Table 5-5 Components of the Recboard

5.5.8 Fixation Ring

The Fixation Ring allows to secure the patient on the Recboard or on the Scoopboard by means of the Straps. The Fixation Ring has to be used if the use of the Straps for securing the patient is not possible, e. g. when transporting the patient with a rescue sheet. The following section explains the use of the Fixation Ring with the example of patient transport with a rescue sheet.

The manufacturer recommends a rescue sheet with a foot bag for patient transport.

The following illustration provides an overview of the components of the Fixation Ring.

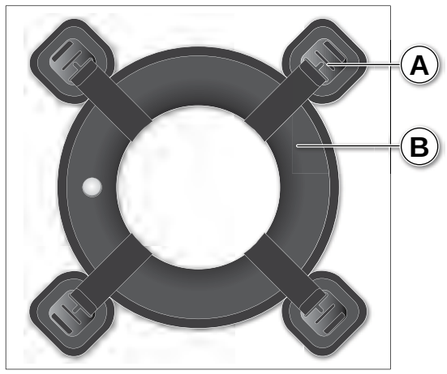


Figure 5-10 Components of the Fixation Ring

Item	Component	Description
A	Magnetic clasp	Part of the buckle of the Fixation Ring serving to fix the attachment straps at the Fixation Ring.

Item	Component	Description
B	Ring	Distributes the traction force evenly around the therapy zone.

Table 5-6 Components of the Fixation Ring

5.5.9 Scoopboard

The Scoopboard allows:

- To perform in-hospital and pre-hospital therapy with the arm of the **corpuls cpr** (refer to 14.2 Therapy with the Scoopboard on page 110).
- Transport of the patient while therapy is in progress, if an appropriate carrying device, such as a rescue sheet or scoop stretcher is used (refer to 14.3 Transport with the Scoopboard on page 111).

The following illustration provides an overview of the components of the Scoopboard:

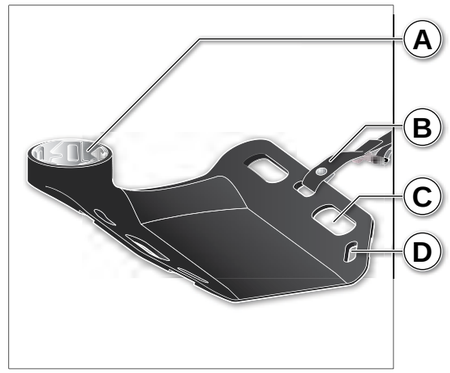


Figure 5-11 Components of the Scoopboard

Item	Component	Description
A	Socket for the arm	Allows assembly of the arm on the Scoopboard.
B	Attachment straps	The following functions are available: • Allow to secure the Scoopboard on a carrying device. • Allow to easily lift the Scoopboard with the patient by means of the hand loops. • Allow to secure the patient on the Scoopboard by means of the Fixation Ring.
C	Handles	Allow to lift the Scoopboard.
D	Eyelets for attachment straps	Allow to install the attachment straps.

Table 5-7 Components of the Scoopboard

5.5.10 Stamp Extension

With the stamp extension, the higher position of the arm that is caused by being assembled on the Scoopboard, can be compensated.

Figure 5-12 Stamp Extension

When using the Scoopboard, always insert the stamp extension.

5.5.11 Quadboard

The Quadboard allows in-hospital therapy using the arm of the **corpuls cpr** (refer to 9 Therapy on page 59).

The following illustration provides an overview of the components of the Quadboard.

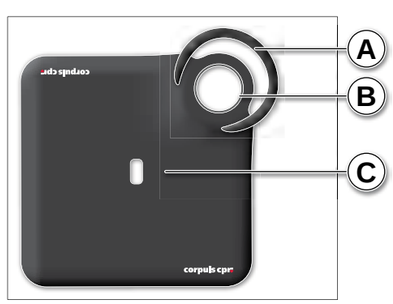


Figure 5-13 Components of the Quadboard

Item	Component	Description
A	Carrying handle	Allows transport of the Quadboard.
B	Socket for the arm	Allows assembly of the arm on the Quadboard.
C	Quadboard	Board for therapy with the arm.

Table 5-8 Components of the Quadboard

5.5.12 External Charger

The external charger allows to charge the battery outside of the arm. The following illustration provides an overview of the components of the external charger.

The external charger can be used as follows:

- Use as desktop charger.

- Use as wall-mounted charger.

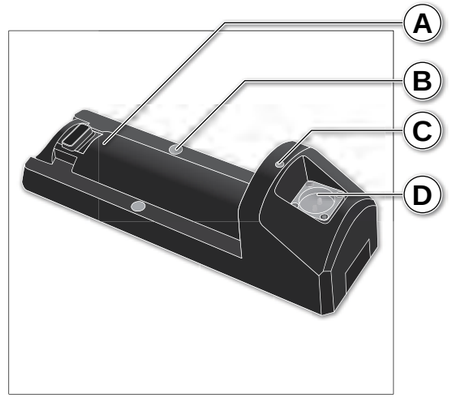


Figure 5-14 External charger

Item	Component	Description
A	Battery shaft	Mechanical and electrical coupling for the battery.
B	Wall-mounting recesses	Allow mounting on a wall.
C	Status display	LED for displaying the status of the external charger.
D	Mains connection	Allows to connect the AC adapter or the DC connector cable.

Table 5-9 External charger

6 Before First Use

This chapter contains basics with which users must familiarise themselves before using the device for the first time.

6.1 Unpacking the Device

Keep the transport box and the packaging material stored (refer to 16.5.2 Repair and Service on page 121).

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

6.2 Check Battery

The battery guarantees the power supply to the **corpuls cpr** arm.

6.2.1 Battery Charging Status

The charging status of the battery is shown on the battery display separately from the operational status of the arm. The number of LEDs lit indicates the charging status of the battery. One LED lit in orange indicates that the battery is empty.

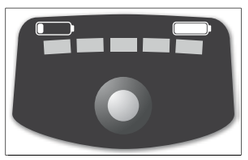


Figure 6-1 Battery display

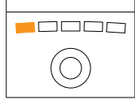
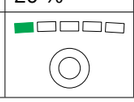
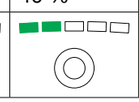
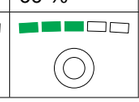
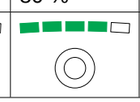
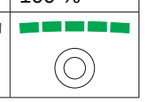
Battery Charging Status					
0 %	1 % to 20 %	21 % to 40 %	41 % to 60 %	61 % to 80 %	81 % to 100 %
					

Table 6-1 Battery Charging Status

The LEDs only light up when the battery is inserted in a switched-on arm or in an external charger that is connected to the mains supply. If a battery is not inserted or if the arm is not switched on, the Charging status key activates the battery display LEDs for 3 s.

As the battery discharges itself if stored over a longer period of time, the battery charging status must be checked regularly. To prevent deep discharge of a battery, the battery and the replacement battery must be used regularly in turns, or the replacement battery must remain in the external charger.

To display the charging status of the battery, proceed as follows:

1. Press the key **Charging status** (refer to 5.4.1 Components of the Battery on page 14).

The LEDs of the battery display show the battery charging status for 3 s.

6.2.2 Charging the Battery

To charge the battery, the following options are available:

- AC adapter (refer to 5.5.1 AC Adapter on page 15)
- DC Connector Cable (refer to 5.5.2 DC Connector Cable on page 15)

While charging is in progress, the battery remains inserted in the arm (refer to 6.2.3 Replacing the Battery on page 26). The user can charge the battery with the arm switched on or off. The charging time of the battery can be found in the technical specifications (refer to E Technical Specifications on page 131). Optionally, the battery can also be charged in the external charger.

The user can operate the arm while charging is in progress.

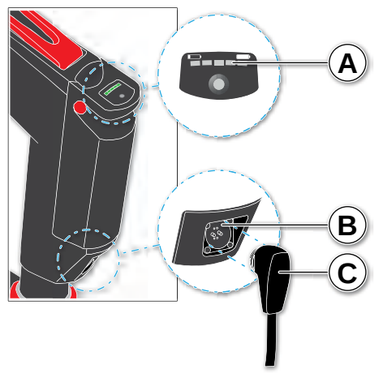


Figure 6-2 Charging the battery

Item	Component	Description
A	Battery display	The following displays are available: • Battery charging status. • Battery charging in progress. • Battery alarms.
B	RoPD contact field	Forms the connection between the arm and the power supply together with the RoPD connector.
C	RoPD connector	Forms the connection between the arm and the power supply together with the RoPD contact field.

Table 6-2 Charging the battery

To charge the battery, proceed as follows:

Prerequisite:

- The battery is inserted correctly in the arm (refer to 6.2.3 Replacing the Battery on page 26)
- The AC adapter or the DC connector cable are connected to a power supply

1. Connect the RoPD connector to the RoPD contact field of the arm.

The battery is charging. The LEDs of the battery display indicate that battery charging is in progress by flashing steadily.

The number of flashing LEDs corresponds to the current battery charging status (refer to 6.2.1 Battery Charging Status on page 24).

The symbol appears in the display field “Info” (refer to Table 7-1 Display and softkeys on page 40).

The display of the switched-on arm indicates the charging status of the battery in percent while charging is in progress (refer to 7.1 Overview of Display and Softkeys on page 39).

If the battery is fully charged and still connected to the power supply, all LEDs are glowing green.

Under the conditions indicated in this user manual (refer to E Technical Specifications on page 131) the battery can stay connected to the mains permanently without any negative effects on the product life span.

6.2.3 Replacing the Battery

The battery of the arm can be replaced with an equivalent battery. Users can replace the battery themselves.

The battery may only be replaced with a battery designated by the manufacturer as an approved accessory (refer to C Approved Accessories, Spare Parts and Consumables on page 129).

The battery must be replaced when:

- The alarm "Battery charging status very low" is shown.
- The alarm "Battery charging status low" appears and the user cannot connect the arm to an external power supply (refer to Medium Priority Alarms on page 50).
- The battery has reached maximum life span (refer to E Technical Specifications on page 131).
- The battery is damaged.
- The LEDs of the battery display indicate an error (refer to 8.4 Battery Alarms on page 56).
- The message or alarm message “Customer service for battery” appears.

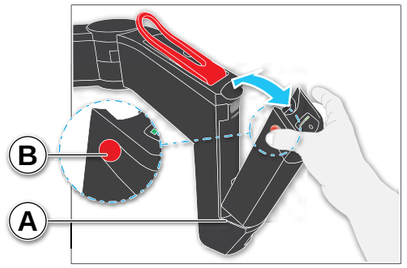


Figure 6-3 Replace battery

Item	Component	Description
A	Battery holder	Allows insertion of the battery in the arm.
B	Unlocking buttons (on both sides)	Allow to unlock the battery.

Table 6-3 Replace battery

To replace the battery, proceed as follows:

1. Press the unlocking button at both sides of the battery.

   The battery is unlocked.
2. Tilt the upper part of the battery backwards.
3. Remove the battery.
4. Insert the new, fully charged battery with the lower part into the battery holder of the arm.
5. Push the upper part of the battery forwards until it snaps into place.

Therapy cannot begin until the battery has clicked into place.

The arm temporarily saves settings that have been changed by the user while the arm is in operation. If the user removes the battery for a maximum of 30 s, these settings will still be available after re-inserting the battery. Otherwise, the user has to re-adjust the settings.

If the remaining battery capacity falls to less than 15 minutes **or** 5 minutes**, the arm shows an alarm in each case (refer to 8.3 Alarms and Messages on the Arm on page 47).**

6.3 Inserting the SD Card

To use all functions of the SD card (refer to 5.5.3 SD Card on page 16), the SD card must be inserted into the arm.

To insert the SD card, proceed as follows:

1. Open the cover of the SD card slot (refer to 5.5.3 SD Card on page 16).
2. Insert the SD card into the SD card slot.

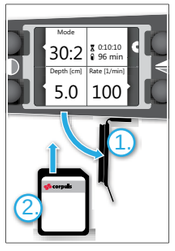


Figure 6-4 Inserting the SD Card

The printed side must face upwards and the marked corner on the right side must point towards the SD card slot.

3. Close the cover of the SD card slot.

Without the SD card, the arm issues a low-priority alarm (refer to 8.3 Alarms and Messages on the Arm on page 47).

In order to prevent the loss of data, first switch off the arm before removing the SD card.

6.4 Pairing (Bluetooth Option)

The first-time connection authorisation (pairing) between two Bluetooth devices can be performed at any user level at any time. During pairing, the two devices exchange data so that they can recognise each other the next time and can connect automatically.

To perform a pairing between the corpuls cpr and another device, there are 2 options:

- Enter the 4-digit Bluetooth PIN from the submenu “Info” in the device to be connected (refer to 11.4.1 Info on page 83).
- If the device to be connected has an NFC reader, the device can be held to the NFC field of the **corpuls cpr** to pair the two devices.

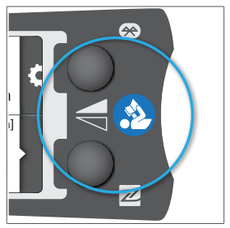


Figure 6-5 NFC field

If the **corpuls cpr** is visible for other devices, the Bluetooth symbol is flashing in the display (refer to Table 11-1 Bluetooth status on page 78). A successful pairing can be seen at the device that is connecting. If the Bluetooth symbol is displayed permanently, both devices are connected.

Devices can also be paired during the mission (refer to 11.1.1 Pairing during a Mission on page 75).

It is possible to pair up to 6 devices. If the maximum number of devices are already paired, for each additional paired device the device that has not been connected for the longest time is deleted from the memory.

6.5 Inserting the Stamp

To ready the arm for use, the user must insert the stamp into the arm.

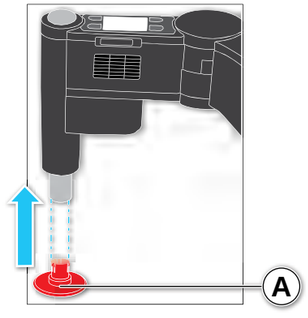


Figure 6-6 Inserting the Stamp

Item	Element	Description
A	Stamp	Allows transfer of compression from the arm to the thorax of the patient.

Table 6-4 Inserting the Stamp

To insert the stamp into the arm, proceed as follows:

1. Insert the stamp from below into its holder at the arm and push in as far as it will go.

   The stamp clicks into position.

6.6 Fixing Attachment Straps on a Board

6.6.1 Recboard

Before using the Recboard for the first time, the attachment straps must be secured to the Recboard. The following instruction describes the assembly of the attachment straps on the Recboard using an anchor loop.

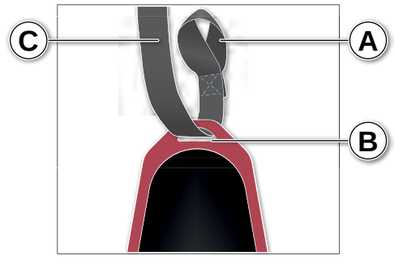


Figure 6-7 Recboard with the attachment strap open

Item	Component	Description
A	Attachment strap loop	Part of the attachment strap
B	Recboard eyelet	Allows to secure the attachment strap to the Recboard.
C	End of the attachment strap with fastener	Part of the attachment strap

Table 6-5 Recboard with the attachment strap

To secure the attachment strap to the Recboard, proceed as follows:

1. Insert the end of the attachment strap (item C) from above through the Recboard eyelet (item B).

2. Guide the end of the attachment strap (item C) completely through the attachment strap loop (item A) and pull tight.

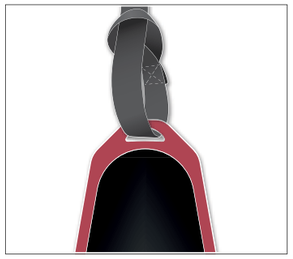


Figure 6-8 Recboard with closed attachment strap

The attachment strap is secured to the Recboard.

In addition to the attachment strap pictured, the attachment strap for the Scoopboard can be used as well. Fastening the attachment straps to the Recboard is analogous to fastening them to the Scoopboard (refer to 6.6.2 Scoopboard on page 32).

6.6.2 Scoopboard

Before using the Scoopboard for the first time, the attachment straps must be secured to the Scoopboard. The following instruction describes the assembly of the attachment straps on the Scoopboard.

To secure the attachment strap to the Scoopboard, proceed as follows:

1. Guide the end of the attachment strap from above through the eyelet of the Scoopboard.

2. Close the snap fastener.

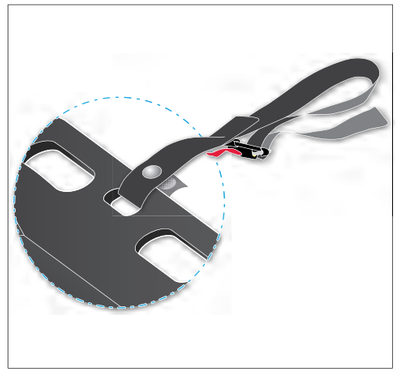


Figure 6-9 Scoopboard with the attachment strap

The attachment strap is secured to the Scoopboard.

6.6.3 Forming Hand Loops from Attachment Straps

Before using a board for the first time, the four attachment straps must be closed to form hand loops. The buckles of the attachment straps are magnetic and easy to open and close.

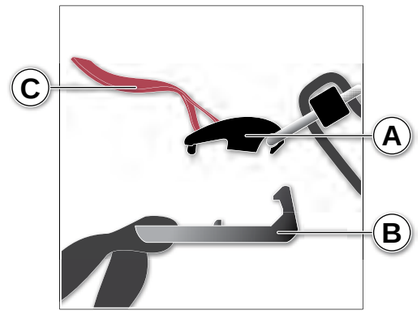


Figure 6-10 Buckle of the attachment strap

Item	Component	Description
A	Magnetic clip	Part of the buckle of the attachment strap
B	Magnetic clasp	Part of the buckle of the attachment strap
C	Red flap	Allows one-handed opening of the buckle

Table 6-6 Buckle of the attachment strap

To form an attachment strap to a hand loop, proceed as follows:

1. Bring the magnetic clasp (item B) and the magnetic clip (item A) towards each other.

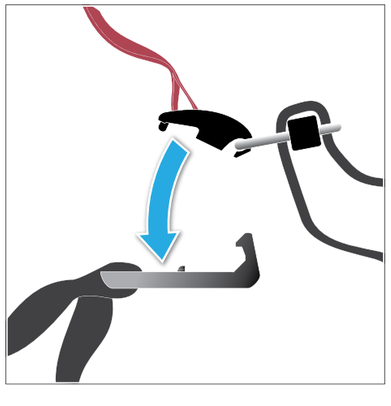


Figure 6-11 Close the attachment strap to form a hand loop

Both parts of the buckle snap together.

The attachment strap forms a hand loop.

Figure 6-12 Attachment straps forming hand loops

When using the Scoopboard, make sure to twist the attachment straps once before closing.

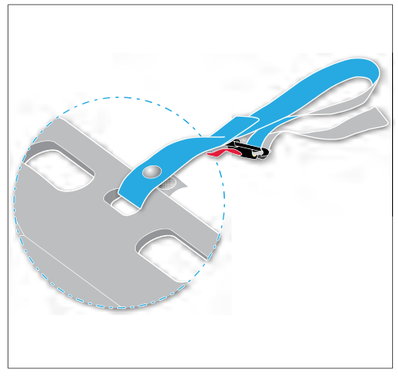


Figure 6-13 Attachment straps Scoopboard, twisted

6.6.4 Opening the Hand Loops of the Attachment Straps

To open an attachment strap, proceed as follows:

1. Pull on the red flap until the magnetic clip comes loose from the magnetic clasp.

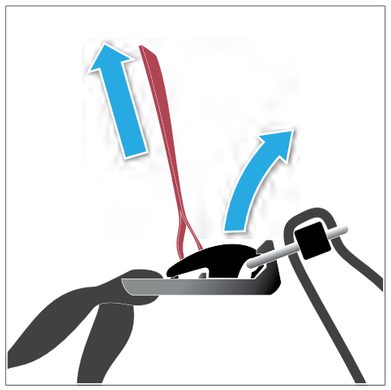


Figure 6-14 Open Attachment Strap

Both parts of the buckle are separated from each other.

The attachment strap is open.

6.7 Attaching Backpack Straps

Before using the carrying bag for the first time, the backpack straps must be attached.

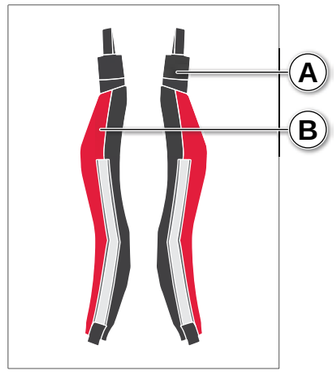


Figure 6-15 Backpack Straps

Item	Component	Description
A	Backpack strap, left	Backpack strap for the left shoulder
B	Backpack strap, right	Backpack strap for the right shoulder

Table 6-7 Backpack Straps

The red strips on the backpack straps have to face outward from the middle when assembling the backpack straps.

The following instruction describes attaching the backpack straps to the carrying bag.

To attach the backpack straps to the carrying bag, proceed as follows:

1. Insert the backpack strap from above into the slot of the carrying bag.

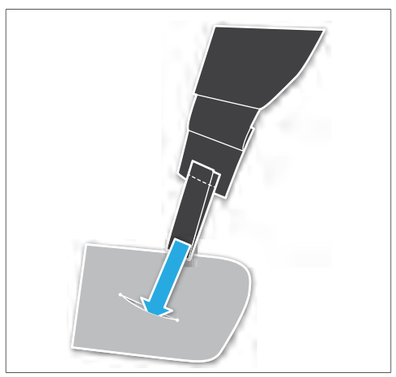


Figure 6-16 Attaching the backpack strap, step 1

2. Completely pull backpack strap through the eyelet.

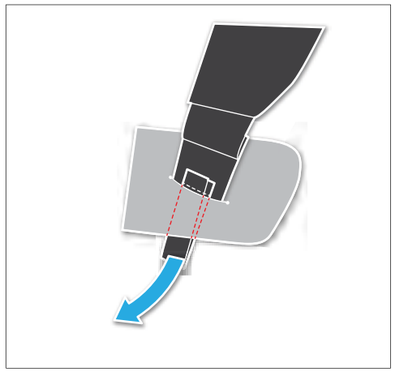


Figure 6-17 Attaching the backpack strap, step 2

Backpack strap is completely inserted into the slot of the carrying bag.

3. Pull out the backpack strap until the anchor catches.

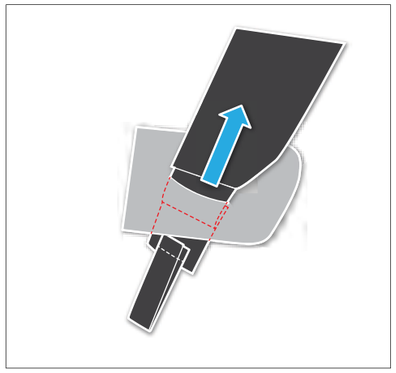


Figure 6-18 Attaching the backpack strap, step 3

The anchor of the backpack strap fixates the strap.

The backpack strap is attached to the carrying bag.

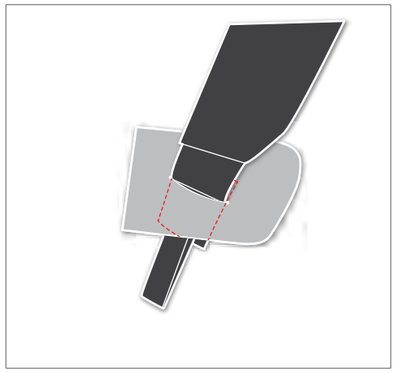


Figure 6-19 Attaching the backpack strap, step 4

7 Operation of the Device

This chapter instructs the user on how to operate the arm.

7.1 Overview of Display and Softkeys

The following illustration provides an overview of the display in usage selection mode ADVANCED (refer to 12.1.4 Usage Selection on page 92) and of the softkeys available on the arm.

The four softkey are assigned different functions depending on the screen display. The corresponding active functions of the softkeys are represented with symbols on the display. The following illustration shows one possible main screen during therapy.

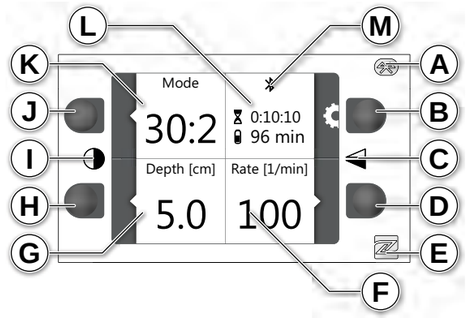


Figure 7-1 Display and softkeys

Item	Element	Description
A	Symbol Bluetooth	Indicates the Bluetooth option.
B	Softkey [Settings]	The following functions are available: • Calling up the menu “Settings”. • Confirming the settings in all menus.
C	Symbol “Rotate display”	Indicates that the function “Rotate display” is available.
D	Softkey [Compression rate]	The following functions are available: • Calling up the menu “Compression rate”. • Cancel the action in all menus without saving. • Confirm alarm messages.
E	Symbol NFC	Indicates the NFC option.
F	Display field “Compression rate”	Shows the configured compression rate.

Item	Element	Description
G	Display field “Compression depth”	Shows the compression depth in [cm].
H	Softkey [Compression depth]	The following functions are available: • Calling up the menu “Compression depth”. • Suspending alarm messages. • Navigating down through all the menus.
I	Symbol “Invert display”	Indicates that the function “Invert display” is available.
J	Softkey [Mode]	The following functions are available: • Calling up the menu “Mode”. • Navigating up through all menus.
K	Display field “Mode”	Shows the configured mode.
L	Display field “Info”	The following displays are possible: • Current time of day. • Deployment time of therapy. • Remaining running time of the battery in [min]. • Battery charging status shown in [%] when operated using an external power supply. • Display of a suspended alarm.
M	Status Bluetooth	Indicates the current Bluetooth status (option).

Table 7-1 Display and softkeys

7.2 Main Screen

The main screen consists of these four display fields:

- Display field “Mode”.
- Display field “Compression rate”.
- Display field “Compression depth”.
- Display field “Info”.

The contents of the display fields “Mode”, “Compression rate” and “Compression depth” correspond to the respective selected therapy settings (refer to 9.4 Therapy Settings on page 67).

The display field “Info” shows important information.

The display of the time and deployment time in the display field “Info” changes every 5 s.

7.3 Menu

In the menu, the user can change the settings of the arm.

The settings can only be changed in usage selection mode ADVANCED (refer to 12.1.4 Usage Selection on page 92).

If the user holds down a softkey for longer than 1 second, quick selection is activated. The user is able to navigate in the menu and change settings faster.

While therapy is in progress, the quick selection function for the depth and rate of compression is deactivated.

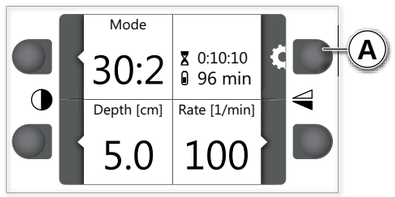


Figure 7-2 Opening the menu

Item	Element	Description
A	Softkey [Settings]	Allows the menu to be opened.

Table 7-2 Opening the menu

To open the menu, proceed as follows:

1. Press the softkey [Settings].

The screen switches to the menu.

7.3.1 Overview of the Menu

The following illustration provides an overview of the menu.

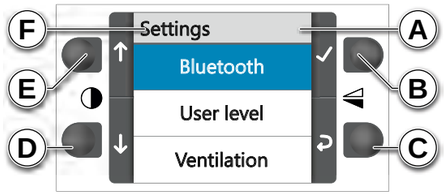


Figure 7-3 Overview menu

Item	Element	Description
A	Menu item	The menu items can: • Open another menu level. • Open a configuration dialogue (refer to 11 Configuration at User Level DEFAULT on page 75).
B	Softkey [OK]	Confirms highlighted menu items.

Item	Element	Description
C	Softkey [Back]	Back to previous screen without confirmation.
D	Softkey [Down]	Navigating down through the menu.
E	Softkey [Up]	Navigating up through the menu.
F	Menu level	Indicates the current menu level.

Table 7-3 Overview menu

7.3.2 Navigating in the Menu

Via the softkeys the user can navigate in the menu.

To navigate in the menu, proceed as follows:

1. Navigate to the menu item using the softkeys [Up] or [Down].
   The menu item is highlighted in blue.
2. To select a menu item, press softkey [OK].
   Another menu level or a configuration dialogue opens.

If the display shows the symbol for the softkey [Back], the user can abort the procedure and return to the former menu.

7.3.3 Confirmation Dialogues

The user has to confirm certain settings before they become active. The following illustration shows the confirmation dialogue “Start update”. All other confirmation dialogues offer similar functionality.

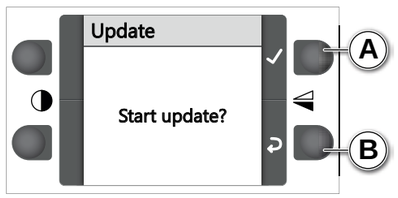


Figure 7-4 Confirmation dialogue

Item	Element	Description
A	Softkey [OK]	Confirms the confirmation dialogue.
B	Softkey [Back]	Back to previous screen without confirmation.

Table 7-4 Confirmation dialogue

To confirm the confirmation dialogue, proceed as follows:

1. Press softkey [OK].

The user has confirmed the confirmation dialogue.

The display shows the previous screen.

7.3.4 Configuration Dialogues

In configuration dialogues, the user can enter values. The following illustration shows the configuration dialogue for LED - Brightness. All other configuration dialogues offer similar functionality.

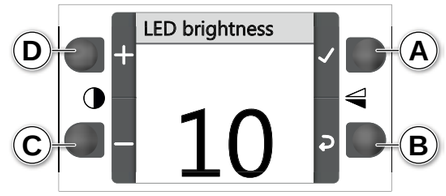


Figure 7-5 Configuration dialogue

Item	Element	Description
A	Softkey [OK]	Confirms the configuration dialogue.
B	Softkey [Back]	Back to previous screen without confirmation.
C	Softkey [Minus]	Reduces the value.
D	Softkey [Plus]	Increases the value.

Table 7-5 Configuration dialogue

To enter values in the configuration dialogue, proceed as follows:

1. Set the value using the softkeys [Plus] and [Minus].
2. Press softkey [OK].

The user has entered a value in the configuration dialogue.

The display shows the previous screen.

7.4 Quick Selection Functions

The quick selection functions allow quick and easy access to certain functions of the arm. The following quick selection functions are available:

- “Rotate display”
- “Invert display”

The quick selection functions “Rotate display” and “Invert display” can be activated from every screen status.

The following illustration describes the quick selection functions using the main screen.

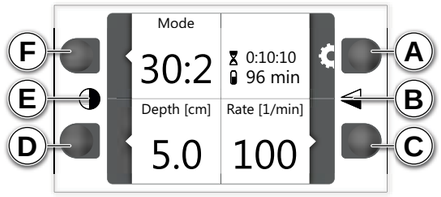


Figure 7-6 Quick selection functions

Item	Element	Description
A	Softkey [A]	Rotating the display: in combination with softkey [C].
B	Symbol “Rotate display”	Indicates that the function “Rotate display” is available.
C	Softkey [C]	Rotating the display: in combination with softkey [A].
D	Softkey [D]	Inverting the display: in combination with softkey [F].
E	Symbol “Invert display”	Indicates that the function “Invert display” is available.
F	Softkey [F]	Inverting the display: in combination with softkey [D].

Table 7-6 Quick selection functions

7.4.1 Rotating the Display

With the quick selection function “Rotate display”, the user can rotate the display by 180 °.

To rotate the display, proceed as follows:

1. Press the softkeys [A] and [C] simultaneously.

The assignment of the softkeys for the quick selection function “Rotate display” does not change when the display is rotated. Both softkeys are always above and below the symbol “Rotate display”.

7.4.2 Inverting the Display

The quick selection function “Invert display” allows the display to be changed to a dark background.

To activate the quick selection function “Invert display”, proceed as follows:

1. Press the softkeys [D] and [F] simultaneously.

The quick selection function “Invert display” has been activated.

The assignment of the softkeys for the quick selection function “Invert display” does not change when the display is rotated. Both softkeys are always above and below the symbol “Invert display”.

7.5 Start Screen

At user level OPERATOR, the user can configure two start screens. When starting the arm, these start screens appear one after another (refer to 12.1.8 Start Screen on page 96).

In the factory settings, not start screen is configured.

WARNING!

Jeopardized therapeutic success due to delayed therapy!

In the usage selection mode BASIC, the user cannot change a wrongly selected patient configuration in the start screen. Changing the patient configuration in the start screen is only possible after switching off the device for 30 s and restarting the device.

► Pay close attention when selecting the patient class.

7.5.1 Start Screen Patient

The following illustration shows the start screen “Patient” (refer to 12.1.8 Start Screen on page 96).

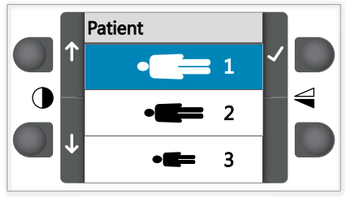


Figure 7-7 Start screen “Patient”

To select the patient group, proceed as follows:

1. Navigate to the patient symbol using the softkeys [Up] and [Down].
2. Confirm the selection using the softkey [Confirm].

The display shows the main screen or the next configured start screen.

7.5.2 Start Screen Mode

The following illustration shows the start screen Mode (refer to 9.4 Therapy Settings on page 67).

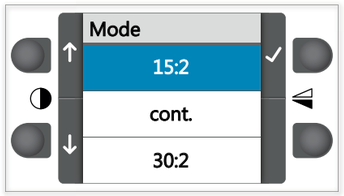


Figure 7-8 Start screen Mode

To select a mode, proceed as follows:

1. Navigate to the mode option using the softkeys [Up] and [Down].
2. Confirm the selection using the softkey [Confirm].

The display shows the main screen.

8 Alarms

This chapter instructs the user about the alarms for the arm and the battery.

8.1 Alarm Design

The alarm line on the display and the LED of the **Start/Stop** key illustrate the alarm priorities visually using different colours (refer to 8 Alarms on page 47). Acoustically, the alarm generator indicates alarm priorities using different tone sequences and volume levels. The user can suspend the alarms. The LED and the alarm generator remind the user that the alarm suspension function is active. For this purpose, the LED flashes once every 60 s, and the alarm generator emits an acoustic signal.

8.2 Warnings

The following warnings inform the user of possible hazards for this chapter.

WARNING!

Jeopardized therapeutic success by not eliminating alarms!

If alarms with a high priority are not eliminated, this can lead failure of the arm and subsequently to aborted therapy.

► Eliminate high priority alarms immediately after their occurrence.

If the display fails while the devices is switched on, the alarm messages (refer to 8.3 Alarms and Messages on the Arm on page 47) can only be signalled acoustically. If the device does no longer react to actions of the user, the intended use is no longer guaranteed. In this case, the user has to perform manual CPR immediately and then contact an authorised sales and service partner.

If the arm fails completely, no alarm messages can be issued at all to inform the user of the failure. This requires from the user a heightened awareness for the device functioning as intended. If the arm fails completely, the user has to perform manual CPR immediately and then contact an authorised sales and service partner.

8.3 Alarms and Messages on the Arm

The arm signals alarms in three ways:

- Visually via the LED of the **Start/Stop** key (refer to 5.2 Components of the Arm on page 11).
- Visually via the alarm line on the display (refer to 7.1 Overview of Display and Softkeys on page 39).
- Acoustically via the speakers of the alarm generator.

During an alarm, the user cannot change settings of the arm. This is also true for suspended alarms. Only the quick selection functions “Rotate display” and “Invert display” are always possible.

The alarm line of the display shows the alarm symbol as well as the alarm ID. This ID allows customer service to determine the exact cause of the alarm.

In case of medium priority alarms, the therapy can be continued (refer to Medium Priority Alarms on page 50).

8.3.1 Priorities of the Alarms

The alarm line of the display and the LED of the **Start/Stop** key always show the active alarm with the highest priority. The background colour of the alarm line and the colour of the LED of the **Start/Stop** key correspond to the priority of the alarm signal.

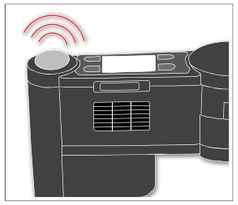


Figure 8-1 LED of the Start/Stop Key

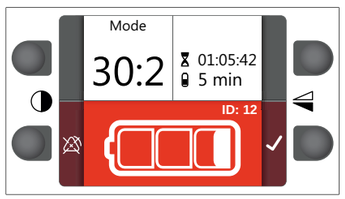


Figure 8-2 Display with active alarm line

The following tables show all alarms of the arm and describe:

- The symbols used.
- The causes of the fault.
- The possible consequences.
- The measures to be taken to eliminate the fault.

High Priority Alarms

Symbol in the display	Cause	Consequences	Measure
	System error	• Injury of the patient possible. • Alarm failure. • Sensor failure. • Therapy failure.	• Switch off the arm* (refer to 9.6 Switching Off the Arm on page 71). • Continue CPR manually without the **corpuls cpr**. • Contact customer service. During the power-down procedure, the alarm symbol appears again as a message.
	Malfunction	• Display incorrect. • Functional error. • Overheating.	• Switch off the arm (refer to 9.6 Switching Off the Arm on page 71). • Continue CPR manually without the **corpuls cpr**. • Contact customer service. During the power-down procedure, the alarm symbol appears again as a message.
	Therapy stopped for longer than 8 s	• No therapy performed on the patient.	• Continue therapy with the **corpuls cpr** (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70). • Confirm the alarm (refer to 8.3.2 Alarm Confirmation and Alarm Suspension on page 52). • Or continue CPR manually without the **corpuls cpr**.
	Battery charging status very low	• Imminent failure of the arm.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or continue CPR manually without the **corpuls cpr**.
	Battery not ready for use	• Arm not operational.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or continue CPR manually without the **corpuls cpr**.
	Temperature of the battery very high	• Battery temperature exceeds specifications. • Imminent failure of the battery.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • If necessary, continue CPR manually without the **corpuls cpr**. During the power-down procedure, the alarm symbol appears again as a message.

Symbol in the display	Cause	Consequences	Measure
	The locking lever was not initially opened after the arm was switched on	• Therapy not possible.	• Open the locking lever. • Adjust the arm and set the therapy position. • Close the locking lever. • Start therapy.
	Locking lever not closed	• Therapy not possible.	• Close the locking lever.
	Arm set too low	• Therapy not possible.	• Raise the arm (refer to 9.3.5 Adjusting the Arm on page 64). • Observe the stamp position check (refer to 9.3.6 Stamp Position Check on page 66).
	Temperature of the arm very high	• Arm temperature exceeds specifications. • Imminent failure of the arm.	• If necessary, continue CPR manually without the **corpuls cpr**. During the power-down procedure, the alarm symbol appears again as a message.

Table 8-1 High Priority Alarms

*** If the arm cannot be switched off in an emergency, remove the battery (refer to 6.2.3 Replacing the Battery on page 26).**

Medium Priority Alarms

Symbol in the display	Cause	Consequences	Measure
	Battery charging status low	• Imminent failure of the arm.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26).
	The maximum life span of the battery has been reached	• The technical specifications of the battery are no longer ensured (refer to E Technical Specifications on page 131).	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or continue CPR manually without the **corpuls cpr**. • Obtain a new reserve battery. During the power-down procedure, the alarm symbol appears as a message.
	Temperature of the battery high	• The specification limits of the battery might be reached.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • If necessary, continue CPR manually without the **corpuls cpr**.

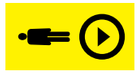
Symbol in the display	Cause	Consequences	Measure
	Faulty battery	• The technical specifications of the battery are no longer ensured (refer to E Technical Specifications on page 131).	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Contact customer service.
	Self-test when starting the arm failed	• The technical specifications of the arm are no longer ensured (refer to E Technical Specifications on page 131). • Therapy might be started with deviations from the technical specification.	• Contact customer service.
	Invalid date/time	Response logs with incorrect date / incorrect time.	• Set the date and time (refer to 11.4.5 Time on page 85) (refer to 11.4.6 Date on page 86).
	Therapy stopped	• No therapy performed on the patient. • After 8 s, the alarm escalates to a high priority alarm.	• Continue therapy with the **corpuls cpr** (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70). • Confirm the alarm (refer to 8.3.2 Alarm Confirmation and Alarm Suspension on page 52). • Or continue CPR manually without the **corpuls cpr**.
	Arm too high	• Configured compression depth cannot be achieved. • Inadequate therapy.	• Lower the arm (refer to 9.3.5 Adjusting the Arm on page 64).
	Temperature of the arm high	• The specification limits of the arm might be reached.	• If necessary, adjust the compression depth and compression rate. • If necessary, continue CPR manually without the **corpuls cpr**.

Table 8-2 Medium priority alarms

Low Priority Alarms

Symbol on the display	Cause	Consequences	Measure
	Read or write error of the SD card	• SD card cannot be used.	• Check SD card. • Or replace SD card. During the power-down procedure, the alarm symbol appears again as a message.

Symbol on the display	Cause	Consequences	Measure
	Free memory < 20 %	• Remaining memory on SD card is low.	• Replace SD card. • Or delete data from the SD card. During the power-down procedure, the alarm symbol appears again as a message.
	SD card full	• No space remaining on SD card.	• Replace SD card. • Or delete data from the SD card. During the power-down procedure, the alarm symbol appears again as a message.

Table 8-3 Low Priority Alarms

8.3.2 Alarm Confirmation and Alarm Suspension

To terminate alarms, the user has to confirm the alarm messages.

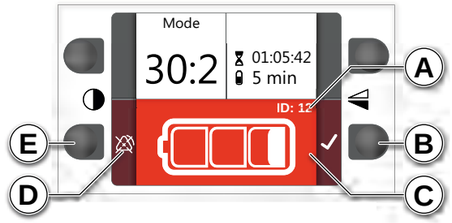


Figure 8-3 Alarm display

Item	Element	Description
A	Alarm ID	Allows a more precise identification of the cause of the alarm.
B	Softkey [Confirm alarm]	Allows confirmation of the audiovisual alarm message. If the alarm condition persists, the audiovisual alarm message appears again.
C	Alarm line	The triggered alarm is displayed with further information.
D	Symbol “Alarm suspension”	Indicates that the function “Alarm suspension” is available.
E	Softkey [Suspend alarm]	Allows suspension of the audiovisual alarm message.

Table 8-4 Alarm display

The user has the option of suspending the alarms for a maximum of 120 s (refer to Alarm Suspension on page 53). The display then shows the symbol in the display field “Info” (refer to Table 7-1 Display and softkeys on page 40).

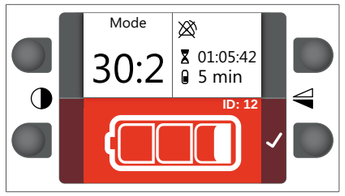


Figure 8-4 Alarms suspended

When alarm suspension is activated, audiovisual alarms are not signalled by the arm for the configured interval. The display still shows alarms in the alarm line.

Alarm Confirmation

Alarm confirmation ends the alarm message. If there are new alarm conditions, the arm signals new alarms.

To confirm the alarm message, proceed as follows:

Prerequisite:

- The arm issues an alarm

1. Press softkey [Confirm alarm].

   The user has confirmed the alarm message. The arm ends alarm message output.

Alarm Suspension

Alarm suspension ends the alarm message. The arm does not signal any further alarms during the configured alarm suspension interval (refer to 12.1.2 Audiovisual Signals on page 90).

To suspend the alarm message, proceed as follows:

Prerequisite:

- The arm issues an alarm

1. Press softkey [Suspend alarm].

   The user has suspended the alarm. An audiovisual signal reminds the user at regular intervals of suspended alarms. The display shows the symbol in the display field “Info”.

If the user only suspends an alarm and does not confirm it, the alarm is still active. The user cannot change settings.

8.3.3 Notes

Representation/symbol on the display	Cause	Consequences	Measure
Blue signal of the LED on the **Start/Stop** key	Compression pause for ventilation	• Notice concerning the ventilation of the patient.	• Ventilate the patient.
	The technical safety check is due	• None	• Contact customer service. During the power-down procedure, the alarm symbol appears as a message.
	Customer service for battery	• None	• Use the reserve battery for the next mission. • Contact customer service. During the power-down procedure, the alarm symbol appears as a message.

Table 8-5 Notes

8.3.4 LED of the Start/Stop Key

The following table shows all the possible colours of the LED of the **Start/Stop** key as well as what they can mean.

Symbol in the display	Designation	Meaning
	Red LED	Possible meaning: • High priority alarm (refer to High Priority Alarms on page 49) • Arm too low (refer to Table 9-5 Stamp Position Check on page 66)
	Yellow LED	Possible meaning: • Medium priority alarm (refer to Medium Priority Alarms on page 50) • Arm too high(refer to Table 9-5 Stamp Position Check on page 66)

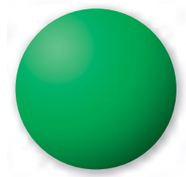
Symbol in the display	Designation	Meaning
	Cyan LED	Low priority alarm (refer to Low Priority Alarms on page 51)
	White LED	Possible meaning: • Self-test passed (refer to 16.3 Selftest on page 118) • corpuls cpr has been found by another device (Bluetooth option)
	Blue LED	Ventilation signal (refer to 11.4.7 Audiovisual Signals on page 87)
	Green LED	Optimum stamp position (refer to 9.3.6 Stamp Position Check on page 66)

Table 8-6 LED of the Start/Stop Key

8.3.5 Messages at Switch Off

During the power-down procedure, the arm repeats signalling of certain alarms that occurred during operation as audiovisual messages:

- **`Temperature of the battery too high.`**
- **`Temperature of the arm too high.`**
- **`The maximum life span of battery has been reached.`**
- **`Battery defective.`**
- **`Read and write error of the SD card.`**
- **`Free memory on the SD card < 20 %.`**
- **`SD card full.`**
- **`Service due`** This message only appears during the power-down procedure and not during ongoing operation.

- **`Customer service for battery.`** This message only appears during the power-down procedure and not during ongoing operation.

The display shows each of these messages for 3 s before the arm switches off. If there are several messages, the display shows these messages one after another.

The user can confirm these messages.

8.4 Battery Alarms

The battery indicates different alarms via flashing LEDs.

If two alarm conditions exist, the battery always indicates the oldest alarm. The battery only indicates the alarm once automatically. The current alarm must then be retrieved by pressing the **Charging status** key.

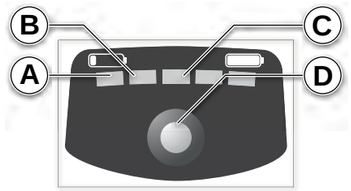


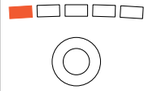
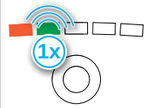
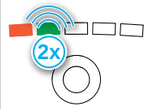
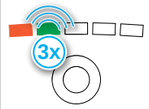
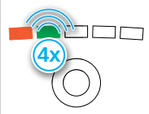
Figure 8-5 Battery keypad with battery display

Item	Component	Properties
A	LED 1	The following statuses are possible: • Off • Orange • Green
B	LED 2	The following statuses are possible: • Off • Green
C	LED 3	The following statuses are possible: • Off • Green
D	Key **Charging status**	The following functions are available: • Activates the charging status (refer to 6.2.1 Battery Charging Status on page 24). • Activates the alarm indication.

Table 8-7 LEDs of the battery display

The following table shows all alarms of the battery and describes:

- The statuses of the LEDs.
- The causes of the fault.
- The possible consequences.
- The measures to be taken to eliminate the fault.

Status of the LEDs	Cause	Consequences	Measure
	Battery empty.	• Imminent failure of the arm.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or connect the arm to a power supply (refer to 6.2.2 Charging the Battery on page 25).
	Battery too cold.	• Battery switches off. • Starting the arm is not possible.	• Warm up the battery. • Or insert a warmed-up and fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). When the battery has warmed up sufficiently, it switches on again automatically. If the battery is inserted in an arm in this case, the arm switches itself on automatically.
	Battery too hot.	• Battery switches off. • Starting the arm is not possible.	• Cool down the battery. • Or insert a colder and fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). When the battery has cooled down sufficiently, it switches on again automatically. If the battery is inserted in an arm in this case, the arm switches itself on automatically.
	Battery voltage too low.	• Battery switches off.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or continue CPR manually without the **corpuls cpr**. The battery will take longer to achieve a battery charge status of 100 % as the voltage is too low (refer to Table A-7 Technical data - Energy management and power output on page 134).
	Battery voltage too high.	• The battery switches off permanently. • Starting the arm is not possible.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Contact customer service.

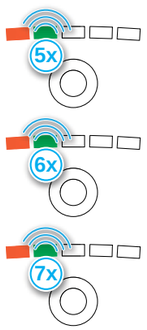
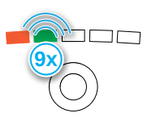
Status of the LEDs	Cause	Consequences	Measure
	Excess current during discharge.	• Battery switches off for 8 s. • Therapy without interruptions not guaranteed. The battery checks its status again after 8 s. If the alarm condition remains, the battery remains switched off. The battery only checks its status three times. After that, it remains permanently switched off.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Contact customer service.
	Excess current during charging.	• Battery switches off. • Starting the arm is not possible.	• Remove the AC adapter. • Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Or continue CPR manually without the **corpuls cpr**. • Contact customer service.
	Critical error.	• The battery switches off permanently. • Starting the arm is not possible.	• Insert fully charged reserve battery (refer to 6.2.3 Replacing the Battery on page 26). • Contact customer service.

Table 8-8 Battery Alarms

To display the status of the battery, proceed as follows:

1. Press the key **Charging status.**

The LEDs of the battery display show the battery status.

9 Therapy

The **corpuls cpr** allows to perform electromechanical thorax compressions.

9.1 Warnings

The following warnings inform the user of possible hazards for this chapter.

DANGER!

Cardiovascular arrest due to aborted therapy!

Leads to organ failure of the patient.

► Avoid interruption of therapy.

► Reduce the time without therapy to a minimum.

DANGER!

Overheating due to heat accumulation!

Leads to a breakdown of the arm and, due to terminated therapy, subsequent organ failure of the patient.

► Do not cover the ventilation slots for air intake and evacuation.

► Keep the ventilation slots for air intake and evacuation clean.

CAUTION!

Neglect of supervisory duty during therapy!

Can lead to injuries of the patient.

► Supervise the device during therapy.

► In case of error stop device and continue therapy manually.

CAUTION!

Injuries as a result of therapy without a stamp!

Can lead to patient injury in the thorax area.

► Always use a stamp for the therapy.

CAUTION!

Crush injury due to the stamp!

Can lead to patient or user injury.

► Keep parts of the body away from the stamp while therapy is in progress.

Thorax compression impairs ECG analysis. Briefly pause therapy for the duration of the ECG analysis (refer to 9.5 Performing Therapy on page 69). Nevertheless, reduce the time without therapy to a minimum.

The quality of the resuscitation procedure has to be rated with available means, e. g. monitoring. If necessary, adjust the therapy settings or continue resuscitation manually.

9.2 Arrival at the Patient

If cardiac arrest is suspected, immediately start manual cardio-pulmonary resuscitation (CPR). While one assistant is preparing therapy with **corpuls cpr**, continue manual CPR without interruption.

9.3 Preparing Therapy

To begin therapy, the user must prepare the patient and the **corpuls cpr**. The following section describes the preparation of therapy using the Quadboard as an example (refer to 5.5.11 Quadboard on page 22).

Therapy preparation is performed in the same way with the Recboard (refer to 5.5.7 Recboard on page 19).

9.3.1 Preparing the Patient

To begin therapy, the user must place the board beneath the patient.

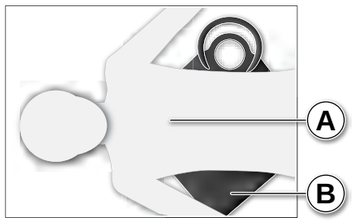


Figure 9-1 Placing the Quadboard beneath the patient

Item	Element	Description
A	Therapy zone	Body region of the patient where therapy is to be performed: • Middle of the sternum.
B	Quadboard	Board for therapy with the arm.

Table 9-1 Placing the Quadboard beneath the patient

Refer to the respective guidelines for the correct definition of the therapy zone for CPR. The latest version is available at: *http://www.cprguidelines.eu/***.**

To place the Quadboard beneath the patient, proceed as follows:

1. Slide the Quadboard beneath the patient's back.

In doing so, ensure that the Quadboard socket for the arm is not obstructed.

The Quadboard is placed beneath the patient.

Remove all items of clothing and jewellery from the thorax area of the patient.

Remove existing CPR feedback sensors from the patient's body.

The manufacturer recommends to position the Quadboard in such a way that the socket for the cpr arm is located besides the patient. If necessary, the socket may also be located besides the head of the patient.

9.3.2 Check Stamp Size

Before starting therapy, the user has to check if the correct size of the stamp is inserted in the arm.

It is the responsibility of the user to select a stamp of the correct size (refer to Table 5-2 Stamp sizes on page 13). The manufacturer recommends to use the corpuls cpr stamp (long) for children aged 8 years or older.

9.3.3 Assembling the Arm

The user must assemble the arm on one of the therapy boards of the **corpuls cpr**. The assembly procedure depends on the type of board.

WARNING!

Damaged equipment due to incorrect assembly of the arm!

Can lead to damage of important or life-saving equipment and to life-threatening patient injury.

► Ensure that no equipment, such as e. g. IV lines, is located between the bayonet lock and the socket of the board during assembly of the arm.

CAUTION!

Risk of crush injuries during assembly of the arm!

Can lead to crush injuries of the patient or the user during assembly of the arm.

► Make sure that no body parts are located between the bayonet lock and the therapy board socket during assembly of the arm.

CAUTION!

Risk of crush injuries!

Can lead to crush injuries in the thorax area of the patient during assembly of the arm.

► Adjust the arm during assembly in such a way that the stamp column is located beside the patient's body.

NOTICE!

Damage due to tilting!

When a load is not applied (no patient weight), the board with the assembled arm can tilt over and damage the **corpuls cpr** and its accessories.

► Do not transport the **corpuls cpr** before it has been assembled. When assembling without a patient, place a load on the board used, e. g. in the case of daily functional testing.

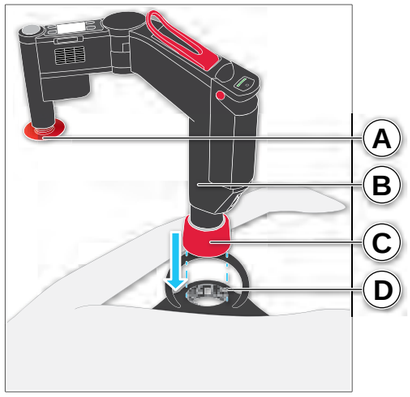


Figure 9-2 Assembling the Arm

Item	Element	Description
A	Stamp column	Telescopic column for holding the stamp.
B	Arm	The arm is the central electromechanical unit for therapy.
C	Bayonet lock	Allows the arm to be assembled on one of the therapy boards.

Item	Element	Description
D	Socket	Counterpart component for the Bayonet lock for assembling the arm on a therapy board.

Table 9-2 Assembling the Arm

To assemble the arm, proceed as follows:

1. Position the arm at the side of the patient.

The stamp must be located beside the patient's body during assembly.

2. Open the bayonet lock by turning and hold.
3. Insert the arm into the Quadboard socket by applying slight pressure from above.
4. Close the bayonet lock.

The arm is securely assembled on the Quadboard.

The user is responsible for checking if the arm is assembled correctly.

9.3.4 Switching on the Arm

To minimise the time without therapy, switch on the arm as soon as possible.

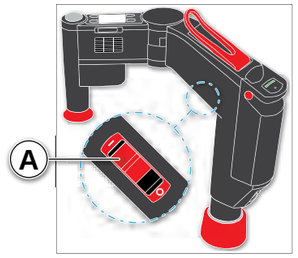


Figure 9-3 Switching on the arm

Item	Component	Description
A	ON/OFF switch	Switches the arm on and off.

Table 9-3 Switching on the arm

To switch on the arm, proceed as follows:

Prerequisite:

- The arm is switched off (refer to 9.6 Switching Off the Arm on page 71)
- A fully charged battery is inserted (refer to 6.2.3 Replacing the Battery on page 26)

1. Push the ON/OFF switch on the underside of the arm to the ON position.

The arm performs a self-test.

During the self-test, the LED of the Start/Stop key briefly flashes white and emits an acoustic signal. If the self-test of the arm is not successful, the display shows corresponding messages (refer to 8 Alarms on page 47).

The main screen (refer to 7.2 Main Screen on page 40) or a start screen (refer to 7.5 Start Screen on page 45) appears.

Once the arm has been switched on, the additional symbol is shown at the centre of the main screen that prompts the user to open the locking lever and adjust the arm. Therapy is not yet possible.

9.3.5 Adjusting the Arm

To begin therapy, the user must position the arm above the patient. The arm can be adjusted in height, pivoted vertically, and further adjusted in the joint.

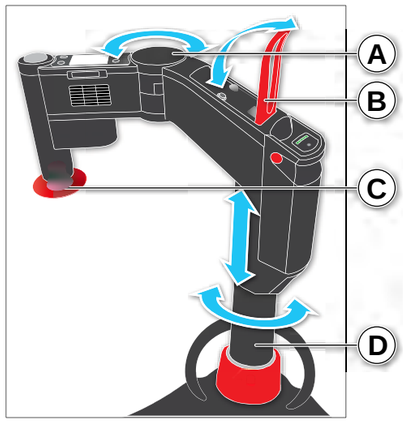


Figure 9-4 Adjusting the Arm

Item	Element	Description
A	Joint	Allows the arm to be swivelled to the left or to the right.
B	Locking lever	The following functions are available: • Immobilisation of the arm at the joint and lifting column. • Releasing the patient.
C	Stamp	Allows transfer of compression from the arm to the thorax of the patient.
D	Lifting column	Telescopic column for adjusting the arm.

Table 9-4 Adjusting the Arm

To position the arm above the patient, proceed as follows:

1. Release the locking lever.

In order to prevent unintentional opening of the locking lever, a certain amount of force is required for opening.

The joint is unlocked. The user can freely rotate the arm and adjust its height.

The stamp position check is active (refer to 9.3.6 Stamp Position Check on page 66).

2. Adjust the stamp in the therapy zone of the patient.

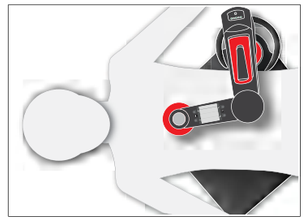


Figure 9-5 Adjusting the arm in the therapy zone

3. Adjust the height of the arm.
4. Place the stamp on the thorax in accordance with the stamp position check (refer to 9.3.6 Stamp Position Check on page 66).
5. Close the locking lever.

The arm is adjusted over the sternum of the patient and immobilised.

Choose the pressure point of the stamp in accordance with the guidelines for CPR.

Therapy can only be started once initial opening of the locking lever has been carried out in order to adjust the arm.

Therapy cannot begin until the locking lever has been closed.

The user is responsible for checking if the locking lever is closed correctly.

The user is responsible for regularly checking the correct position of the stamp.

9.3.6 Stamp Position Check

If the user adjusts the arm too high or too low, either full release of the thorax or optimum compression depth cannot be achieved. The stamp position check provides the user with information as to whether the stamp is correctly positioned on the thorax. In this way, the stamp position check helps the user to adjust the height of the arm correctly. The arm shows the result of the stamp position check using the LED of the **Start/Stop** key and the display.

After the user has switched on the arm and released the locking lever, the stamp position check starts. The following table shows the possible results, corresponding descriptions, and necessary measures that the user must take.

Result		Description	Measure
LED of the Start/Stop Key	**Symbol on the display**		
		• Arm too low. • Release of the thorax not ensured. • Therapy not possible.	Raise the arm.
		• Arm too high. • Stamp does not have any contact with the thorax. • Therapy is possible, but not recommended. • Configured compression depth not ensured throughout.	Lower the arm.
		• Arm adjusted optimally. • Full release and configured compression depth are ensured.	None.

Table 9-5 Stamp Position Check

After every pause for ventilation or after 100 compressions in continuous mode, the arm re-checks the stamp position and attempts to compensate for a sunken thorax if required. If the arm can no longer compensate the difference, the arm signals a medium priority alarm (refer to Table 8-2 Medium priority alarms on page 51).

The arm regularly checks whether full release of the thorax is achieved. If full release of the thorax is no longer ensured, the arm signals a high priority alarm (refer to High Priority Alarms on page 49).

9.4 Therapy Settings

The following therapy settings may be selected:

Display field	Setting option	Description
Mode	• 30:2 • 15:2 • cont.	• Ratio of compressions to ventilation cycles • Continuous compressions without pauses for ventilation
Compression depth	• 2.0 cm to 6.0 cm	• Adjustable in increments of 0.1 cm
Compression rate	• 80 /min to 120 / min compressions	• Configurable in increments of 1 /min

Table 9-6 Therapy Settings

9.4.1 Configuring Therapy Settings

The user can configure the therapy settings before as well as during therapy.

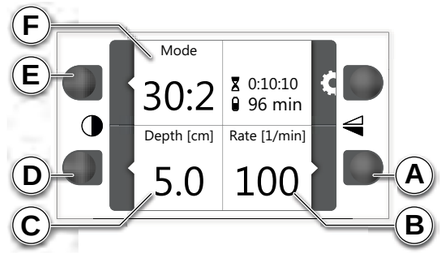


Figure 9-6 Therapy settings - display on main screen

Item	Element	Description
A	Softkey [Compression rate]	Calls up the configuration dialogue “Compression rate”.
B	Display field “Compression rate”	Shows the configured compression rate in 1 /min.
C	Display field “Compression depth”	Shows the compression depth in cm.
D	Softkey [Compression depth]	Calls up the configuration dialogue “Compression depth”.
E	Softkey [Mode]	Calls up the selection dialogue “Mode”.

Item	Element	Description
F	Display field “Mode”	Shows the configured mode.

Table 9-7 Therapy settings - display on main screen

The user can only modify the therapy settings for compression depth and compression rate in usage selection mode ADVANCED (refer to 12.1.4 Usage Selection on page 92).

Mode

To open the selection dialogue “Mode”, proceed as follows:

1. Press the softkey [Mode].

The selection dialogue “Mode” appears.

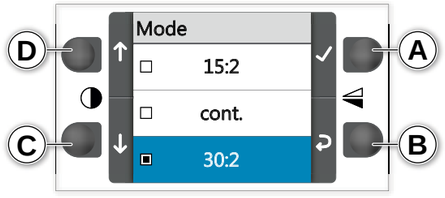


Figure 9-7 Selection dialogue “Mode”

Item	Element	Description
A	Softkey [Confirm]	Activates the checkbox for the highlighted mode.
B	Softkey [Back]	Back to previous screen.
C	Softkey [Down]	Navigates down through the selection dialogue.
D	Softkey [Up]	Navigates up through the selection dialogue.

Table 9-8 Selection dialogue “Mode”

To select a therapy mode, proceed as follows:

1. Navigate to the mode option using the softkeys [Up] and [Down].
2. Activate the checkbox using the softkey [Confirm].
3. Return to the main screen using the softkey [Back].

Compression depth and compression rate

To change the compression rate or compression depth, proceed as follows:

1. Press the softkey [Compression rate] or [Compression depth].

The configuration dialogue “Compression rate” or “Compression depth” appears (refer to 7.3.4 Configuration Dialogues on page 43).

The user does not need to confirm the configuration dialogues for compression rate and compression depth. The changed settings are immediately active. This only applies for the configuration dialogues of the main screen.

2. Return to the main screen using the softkey [Back].

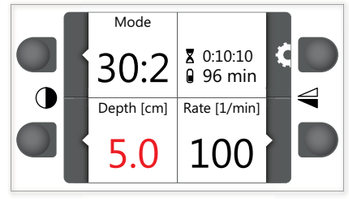


Figure 9-8 Compression depth if the thorax is very rigid

In patients whose thorax is very rigid, it is possible that the user might not operate the corpuls cpr in accordance with specifications. As a result, the configured compression depth is no longer ensured throughout. The display then shows the compression depth in red.

9.5 Performing Therapy

This chapter describes how to start, stop/pause and resume therapy.

9.5.1 Softstart

So that the thorax of the patient can adjust to the compressions, the arm gradually increases the compression depth. When starting therapy initially or when continuing therapy after operating the locking lever, the arm starts with a softstart.

Compression	Compression depth
First compression	52 % of the configured compression depth.
Second compression	75 % of the configured compression depth.
Third compression	89 % of the configured compression depth.
All further compressions	100 % of the configured compression depth.

Table 9-9 Softstart

After a compression pause for ventilation, the arm begins therapy at 100% of the configured compression depth.

9.5.2 Starting, stopping/pausing and continuing Therapy

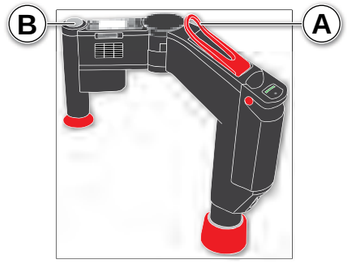


Figure 9-9 Starting, stopping/pausing and continuing therapy

Item	Element	Description
A	Locking lever	The following functions are available: • Immobilisation of the arm. • Releasing the patient.
B	**Start/Stop** key	The following functions are available: • Starting therapy • Pausing/stopping the therapy • Displaying alarms

Table 9-10 Starting, stopping/pausing and continuing therapy

To start the therapy, proceed as follows:

Prerequisite:

- The arm is switched on and operational (refer to 9.3.4 Switching on the Arm on page 63)
- The arm is adjusted (refer to 9.3.5 Adjusting the Arm on page 64)
- The stamp position check allows the therapy to begin (refer to 9.3.6 Stamp Position Check on page 66)

1. Press the **Start/Stop** key.

Therapy starts.

Therapy begins with factory settings (refer to 10 Reset to Factory Settings on page 74), or with settings that have been adjusted by the OPERATOR (refer to 12.1.9 Storing the Configuration on page 97).

Therapy cannot begin until the locking lever has been closed.

Therapy can only be started once initial opening of the locking lever has been carried out in order to adjust the arm.

To stop/pause therapy, proceed as follows:

Prerequisite:

- Therapy has been started

1. Press the **Start/Stop** key.

The arm stops/pauses therapy. Full release of the thorax.

The function “Pause Therapy” only interrupts therapy. The current settings are retained for further continuation of the therapy.

The LED of the Start/Stop key indicates a pause in therapy by flashing yellow and an acoustic alarm signal is emitted. The display shows a medium priority alarm. If therapy is not resumed within 8 s**, this alarm is escalated to a higher priority (refer to Table 8-1 High Priority Alarms on page 50).**

In an emergency, therapy can be interrupted using the following measures:

- Press the **Start/Stop** key (refer to Figure 5-1 Components of the arm on page 11).
- Switch off the arm (refer to 9.6 Switching Off the Arm on page 71).
- Open the locking lever (refer to 5.2 Components of the Arm on page 11).
- Remove the battery (refer to 6.2.3 Replacing the Battery on page 26).

To resume therapy, proceed as follows:

Prerequisite:

- Therapy is paused

1. Press the **Start/Stop** key.

The arm resumes therapy using the previous therapy settings.

Therapy cannot begin until the locking lever has been closed.

The user can also resume therapy while the "Therapy stopped" alarm is active. The alarm is then stopped.

9.5.3 Battery Replacement Concept

If the battery needs to be replaced while therapy is in progress, this is possible without losing the current therapy settings (refer to 9.4 Therapy Settings on page 67). Even if the battery has been removed, these therapy settings remain saved for a maximum of 30 s. Restarting therapy after replacing the battery is possible without initially opening the locking lever.

To reduce the time without therapy to a minimum, always have a charged reserve battery available.

9.6 Switching Off the Arm

If no further therapy is planned, the arm must be switched off.

First stop therapy, then switch off the arm.

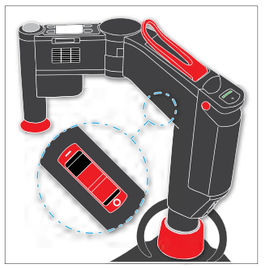


Figure 9-10 Switching Off the Arm

To switch off the arm, proceed as follows:

Prerequisite:

- The arm is switched on (refer to 9.3.4 Switching on the Arm on page 63)
- Therapy has been stopped (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70)

1. Push the ON/OFF switch on the underside of the arm to the OFF position.

On the display of the arm, a countdown appears. This countdown signals to the user that the arm will switch itself off within 5 s*. The device emits an indication tone and the LED of the* **Start/Stop** *key flashes up white. The display goes dark.*

Before the countdown, messages may appear on the display unit of the arm. The user can confirm these messages (refer to 8.3.2 Alarm Confirmation and Alarm Suspension on page 52).

The user can cancel the power-down procedure during the countdown. To do so, push the ON/OFF switch to the ON position. The display shows the previous screen content.

If the user switches the arm on again within 30 s, all previously modified settings are retained (refer to 9.5.3 Battery Replacement Concept on page 71).

Switching the arm off while therapy is in progress ends therapy immediately. The arm does not signal any alarm.

9.7 Removing the Stamp

The following section describes removing the stamp from the arm.

To remove the stamp from the arm, proceed as follows:

1. Pull the stamp downwards out of the holder on the arm (refer to Figure 5-1 Components of the arm on page 11).

9.8 Disassembling the Arm

To disassemble the arm, proceed as follows:

Prerequisite:

- The arm is switched off (refer to 9.6 Switching Off the Arm on page 71)

1. Turn the bayonet lock counterclockwise and hold.
2. Pull the arm upwards from the socket of the therapy board.

To disassemble the arm, the user needs both hands.

10 Reset to Factory Settings

Setting		Value
Mode		30:2
Compression depth		5.5 cm
Compression rate		100 1/min
Usage selection		Advanced
User level		DEFAULT
Duration of the pause for ventilation		4 s
Volume		10
LED - Brightness		7
Backlight		7
Start screens		Not active
Key tone		Enabled
Ventilation signal frequency		10 1/min
Duration of alarm suspension		120 s
Code for user level DEFAULT		0 0 0 0
Code for user level OPERATOR		1 0 0 0
Bluetooth		Not active
BT PIN		1 2 3 4
LED		Enabled
Audio		Enabled
Reminder signal		Enabled
Language		English
Patient group 1	Mode	30:2
	Compression depth	6.0 cm
	Compression rate	100 1/min
Patient group 2	Mode	30:2
	Compression depth	5.5 cm
	Compression rate	100 1/min
Patient group 3	Mode	30:2
	Compression depth	5.0 cm
	Compression rate	100 1/min

Table 10-1 Factory settings

11 Configuration at User Level DEFAULT

The user can log in at different user levels. Every user level has different configuration options. Non visible configuration options can only be accessed at higher user levels. This chapter provides an overview of the configuration options at user level DEFAULT.

At user level DEFAULT, changed settings cannot be saved. These settings are no longer available when the arm is restarted. The arm saves date and time settings automatically.

Changed settings can only be permanently saved at user level OPERATOR or higher.

The user can only change settings in usage selection mode ADVANCED.

11.1 Menu item Bluetooth

The device to be connected has to be within reach (typically <10 m) of the **corpuls cpr**. Establishing a connection can take several seconds.

11.1.1 Pairing during a Mission

It is recommended to perform pairing between the **corpuls cpr** and other possible devices beforehand (refer to 6.4 Pairing (Bluetooth Option) on page 29).
If this is not possible, pairing can also be performed during the mission.

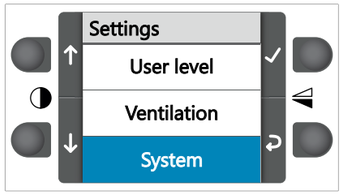


Figure 11-1 Bluetooth

There are two options to pair the **corpuls cpr** with another device during the mission:

- Bluetooth PIN
- NFC (near field communication)

To pair the corpuls cpr ***via Bluetooth PIN, proceed as follows:***

1. Navigate with the softkeys [Up] and [Down] to the menu item “Bluetooth”.

2. Select by pressing the softkey [Confirm].

   The main screen with a flashing Bluetooth symbol appears.

The Bluetooth symbol flashes for 2 min**. The flashing Bluetooth symbol indicates that the corpuls cpr can be discovered by and be paired with other devices.**

The Bluetooth PIN of the corpuls cpr can be found in the submenu ► "Info**".**

3. Enter the Bluetooth PIN of the **corpuls cpr** in the device to be connected.

corpuls cpr *is paired via Bluetooth PIN.*

If the pairing is successful, a connection is established and the Bluetooth symbol is displayed permanently.

To pair corpuls cpr ***via NFC, proceed as follows:***

Prerequisite:

- The device to be paired has NFC functionality.
- The device to be paired can interpret the NFC data of the **corpuls cpr**.
- The **corpuls cpr** and the device to be paired are switched on.

1. Preparing the device to be paired for pairing via NFC.

For information on the use of the device to be paired refer to the respective user manual.

2. Hold the device to be paired to the NFC chip of the **corpuls cpr**.

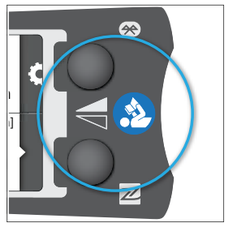


Figure 11-2 NFC tag

The NFC chip is located between the symbols Bluetooth and NFC of the display of the corpuls cpr.

MAC address and Bluetooth PIN of the **corpuls cpr** *are transferred to the device to be paired.*

Both devices have been paired via NFC.

If the Bluetooth function is not activated, it will be activated for the purpose of pairing.

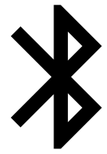
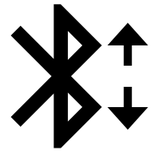
If the Bluetooth function is permanently disabled by the user OPERATOR (refer to 12.1.3 Bluetooth on page 91) or the option Bluetooth is not available, the message „Bluetooth blocked, action not possible.“ appears in the display.

If the Bluetooth PIN has been changed by the user OPERATOR, a pairing via NFC without updating the NFC data is not possible.

11.1.2 Status Bluetooth

The status of the Bluetooth connection is indicated in the main screen.

The following table shows the possible statuses:

Symbol	Description	Status
	No Bluetooth symbol.	No Bluetooth connection is established.
	Flashing Bluetooth symbol.	Bluetooth in Discovery mode. corpuls cpr is visible for other devices.
	Permanent Bluetooth symbol.	A Bluetooth connection exists.
	Permanent Bluetooth symbol with number.	Several Bluetooth connections exist. The number indicates the number of existing Bluetooth connections.
	Permanent Bluetooth symbol with arrows.	Bluetooth connection with data transmission of larger amounts of data (e.g. mission data).

Symbol	Description	Status
	Permanent greyed ou Bluetooth symbol with “X”.	Bluetooth connection not possible due to technical reasons.

Table 11-1 Bluetooth status

11.2 Menu Item User Level

To change the settings of the arm, the user must open the menu “Settings” (refer to 7.3 Menu on page 40).

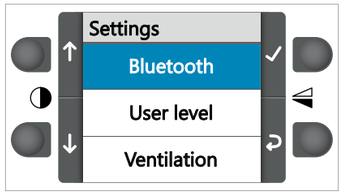


Figure 11-3 Settings

To activate the selection of the user level, proceed as follows:

1. Navigate to the menu item “User level” using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

The display switches to the login screen for entering the 4-digit code.

The user can switch to another user level by entering a 4-digit code (refer to 10 Reset to Factory Settings on page 74).

The following user levels may be selected:

- DEFAULT
- OPERATOR

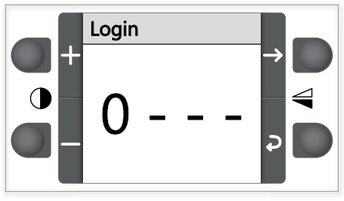


Figure 11-4 Login screen

To enter the code, proceed as follows:

1. Navigate to the location of the code using the softkeys [Right] and [Left].
2. Set the number using the softkeys [Plus] and [Minus].
3. Confirm the code entered by pressing the softkey [Confirm].

The softkey[Confirm] can only be selected when the last digit of the code is highlighted.

Once the code has been confirmed, the display shows one of the following messages for 3 s*:*

- If a mistake has been made during entry:
  - “Invalid code”
- If entered correctly:
  - “Logged in as: <User level>”

After 3 s, the display switches back to the settings menu.

11.3 Menu Item Ventilation

Depending on the therapy mode, different ventilation messages can be configured.

Ventilation message	15:2	30:2	cont.
Switching the acoustic reminder signal on or off for the last five compressions before a pause for ventilation.	Yes	Yes	No
Switching on or off the blue reminder signal of the LED of the **Start/Stop** key during the compression pause for ventilation.	Yes	Yes	No
Configure the duration of the compression pause for ventilation.	Yes	Yes	No
Switching the acoustic reminder signal for ventilation on or off.	No	No	Yes
Switching on or off the blue reminder signal of the LED of the **Start/Stop** key for ventilation.	No	No	Yes
Setting the repetition frequency of the ventilation message.	No	No	Yes

Table 11-2 Overview of ventilation messages

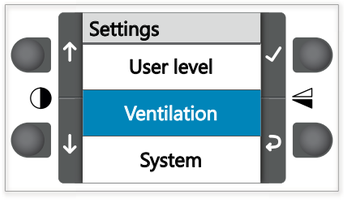


Figure 11-5 Menu Item Ventilation

To open the menu item "Ventilation***", proceed as follows:***

1. Navigate to the menu item "Ventilation" using the softkeys [Up] and [Down].

2. Activate the selection using the softkey [Confirm].

   *The menu item "*Ventilation*" is open.*

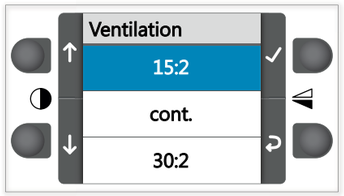


Figure 11-6 Ventilation menu

The display shows the therapy modes.

To select a therapy mode, proceed as follows:

1. Navigate to the therapy mode using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

The display shows the configuration options for ventilation in the selected therapy mode.

11.3.1 Therapy Modes 15:2 and 30:2

The configuration options for the therapy modes 15:2 and 30:2 are identical.

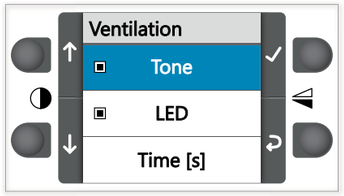


Figure 11-7 Therapy Modes 15:2 and 30:2

The following settings are possible:

- Acoustic reminder signal.
- Reminder signal of the LED of the **Start/Stop** key.
- Duration of the ventilation pause.

Tone The acoustic reminder signal for the last five compressions before a pause for ventilation can be switched on or off.

To switch the acoustic reminder signal for ventilation on or off, proceed as follows:

1. Navigate to the submenu item ► "Tone" using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The acoustic reminder signal for ventilation is switched on or off.

LED The reminder signal of the LED of the **Start/Stop** key during the compression pause for ventilation can be switched on or off.

To switch the reminder signal for ventilation on or off, proceed as follows:

1. Navigate to the submenu item ► "LED" using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The reminder signal for ventilation is switched on or off.

Time [s] The ventilation pause can be set in 1-second steps from 3 s to 8 s.

To configure the duration of the compression pause for ventilation, proceed as follows:

1. Navigate to the submenu item ► "Time [s]" using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

   The configuration dialogue “Time [s]” appears (refer to 7.3.4 Configuration Dialogues on page 43).

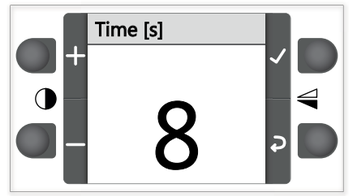


Figure 11-8 Configuration dialogue “Time [s]”

3. Configure the duration of the compression pause for ventilation.

The duration of the compression pause for ventilation has been configured. The display shows the previous screen.

11.3.2 Therapy Mode Cont.

In therapy mode “Cont.”, an audiovisual reminder signal for ventilation can be set.

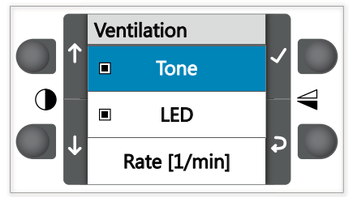


Figure 11-9 Therapy mode Cont.

The following settings are possible:

- Acoustic reminder signal for ventilation.
- Reminder signal of the LED of the **Start/Stop** key for ventilation.
- Repetition frequency of the visual and acoustic reminder signals.

Tone The acoustic reminder signals for ventilation during continuous therapy can be switched on or off.

To switch the acoustic reminder signals on or off, proceed as follows:

1. Navigate to the submenu item ► "Tone" using the softkeys [Up] and [Down].

2. Activate or deactivate the checkbox using the softkey [Confirm].

The acoustic reminder signals have been switched on or off.

LED The reminder signals for ventilation during continuous therapy can be switched on or off.

To switch the reminder signal on or off, proceed as follows:

1. Navigate to the submenu item ► "LED" using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The reminder signal has been switched on or off.

Rate [1/min] The repetition frequency of the acoustic and visual reminder signals can be set in increments of 6 to 30 times per minute.

To configure the repetition frequency of the acoustic and visual reminder signals, proceed as follows:

1. Navigate to the submenu item ► "Rate [1/min]" using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

   The configuration dialogue “Ventilation rate [1/min]” appears (refer to 7.3.4 Configuration Dialogues on page 43).

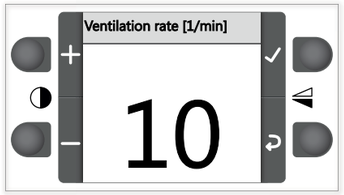


Figure 11-10 Configuration dialogue “Ventilation rate [1/min]”

3. Adjust the repetition frequency of the visual and acoustic reminder signals.

The repetition frequency of the acoustic and visual reminder signals has been configured. The display shows the previous screen.

To minimise the risk of stomach distention or gastric reflux, make sure to ventilate simultaneously the the reminder tone and reminder signal. Reminder tone and reminder signal are synchronised with the moment of full release.

11.4 Menu Item System

In the menu item "System", general settings for the arm can be configured.

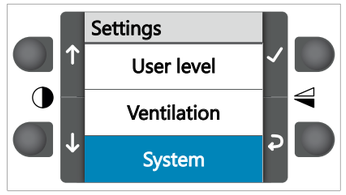


Figure 11-11 Menu item System

To open the menu item "**System**", proceed as follows:

1. Navigate to the menu item "System" using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

   *The menu item "*System*" is open.*

*The display shows the contents of the menu item "*System*".*

The menu item "System" contains the following entries:

- Info
- LED - Brightness
- Backlight
- Volume
- Time
- Date
- Audiovisual signals
- Bluetooth

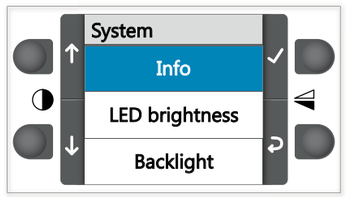


Figure 11-12 Menu Item System

To configure the system settings, proceed as follows:

1. Navigate to a ► "Submenu item" using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

*The display shows the contents of the selected ► "*Submenu item*".*

11.4.1 Info

The submenu item ► "Info" includes the following contents:

Display	Description
Serial number	Serial number
SPC version	Version of the application software
SPC boot version	Bootloader version
Resources version	Version of the resources file
STM version	Version of the control firmware
Bluetooth MAC	MAC address of the Bluetooth module
Bluetooth PIN	PIN code of the Bluetooth module
Next STK	Date of the next technical safety check
Batt. ser. number	Battery serial number
Batt. lot number	Lot number of the battery
Batt. prod. date	Production date of the battery
Batt. cycle count	Number of charging cycles of the battery
Power on time	Operating hours
Tot. therapy time	Deployment time

Table 11-3 Info

11.4.2 LED Brightness

The brightness of the LED of the **Start/Stop** key can be gradually adjusted from 1 to 10 in a configuration dialogue (refer to 7.3.4 Configuration Dialogues on page 43).

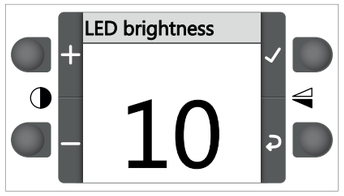


Figure 11-13 LED brightness

11.4.3 Backlight

The brightness of the display can be configured in increments of 1 to 10 in a configuration dialogue (refer to 7.3.4 Configuration Dialogues on page 43).

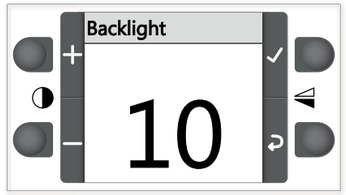


Figure 11-14 Backlight

11.4.4 Volume

The volume of the signals can only be viewed at user level DEFAULT.

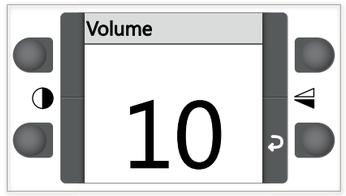


Figure 11-15 Volume

11.4.5 Time

The user can set the time.

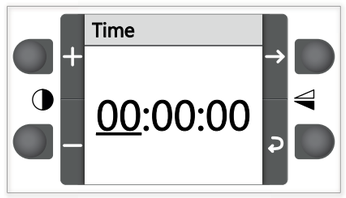


Figure 11-16 Time - hours

To set the current time, proceed as follows:

1. Set the correct time (hours) using the softkeys [Plus] and [Minus].
2. Select the minutes using the softkey [Right].

The minutes are highlighted.

Figure 11-17 Time - minutes

3. Set the correct time (minutes) using the softkeys [Plus] and [Minus].
4. Select the seconds using the softkey [Right].
   The seconds are highlighted.

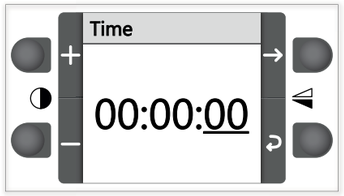


Figure 11-18 Time - seconds

5. Set the correct time (seconds) using the softkeys [Plus] and [Minus].
6. Confirm the time entered by pressing the softkey [Confirm].

The softkey [Confirm] can only be selected when the seconds are highlighted.

The time has been set.

11.4.6 Date

The user can set the date.

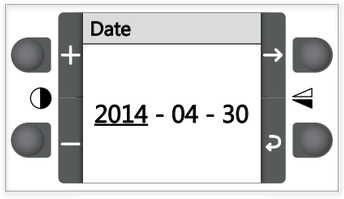


Figure 11-19 Date - year

To set the date, proceed as follows:

1. Set the correct year using the softkeys [Plus] and [Minus].
2. Select the month using the softkey [Right].

The month is highlighted.

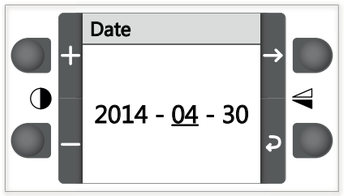


Figure 11-20 Date - month

3. Set the correct month using the softkeys [Plus] and [Minus].
4. Select the day using the softkey [Right].
   The day is highlighted.

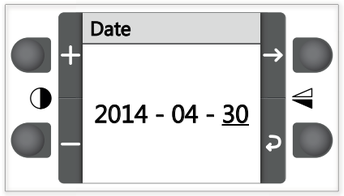


Figure 11-21 Date - day

5. Set the correct day using the softkeys [Plus] and [Minus].
6. Confirm the date entered by pressing the softkey [Confirm].

The softkey [Confirm] can only be selected when the day is highlighted.

The date has been set.

11.4.7 Audiovisual Signals

The user can activate or deactivate the key tones in the submenu item ► "Audiovisual signals".

At user level OPERATOR, additional settings are available (refer to 12 Configuration at User Level OPERATOR on page 89).

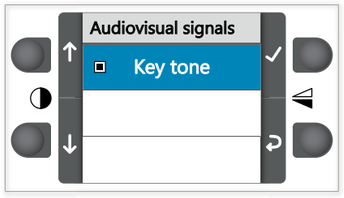


Figure 11-22 Audiovisual Signals

To switch the key tones on or off, proceed as follows:

1. Activate or deactivate the checkbox using the softkey [Confirm].

The key tones have been switched on or off.

11.4.8 Bluetooth

In the submenu item ► "Bluetooth" settings of the Bluetooth function can be configured.

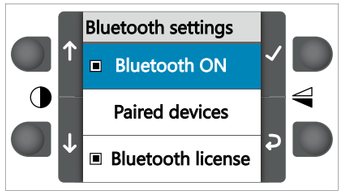


Figure 11-23 Bluetooth settings

The following configuration options are available:

- Bluetooth ON
- Paired devices
- Bluetooth licence

The settings of the Bluetooth function can only be changed in usage selection mode ADVANCED .

To enable or disable the Bluetooth function, proceed as follows:

1. Navigate to the menu item “Bluetooth ON” using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The Bluetooth function is enabled or disabled.

If the Bluetooth function is permanently disabled by the user OPERATOR (refer to 12.1.3 Bluetooth on page 91) or the option Bluetooth is not available, the message „Bluetooth blocked, action not possible.“ appears in the display.

To call up a list of already paired devices, proceed as follows:

1. Navigate to the menu item “Paired devices” using the softkeys [Up] and [Down].
2. Open the list with the softkey [Confirm].

In the display appears the list of already paired devices with Mac addresses.

Up to 6 devices can be displayed in the list. If another device is connected, the device that was not connected with the corpuls cpr for the longest time will be deleted from the list of paired devices.

If a Bluetooth option is available, the checkbox of the submenu item ► "Licence" is selected.

12 Configuration at User Level OPERATOR

At user level OPERATOR, the same configuration options are available as at user level DEFAULT (refer to 11 Configuration at User Level DEFAULT on page 75). This chapter provides an overview of the additional configuration options at user level OPERATOR.

The arm always starts at user level DEFAULT. To change settings at user level OPERATOR, the user must be logged in at user level OPERATOR (refer to 11.2 Menu Item User Level on page 78).

So that the modified settings are active the next time the arm is started, the user must save these settings (refer to 12.1.9 Storing the Configuration on page 97).

12.1 Menu Item System

To open the menu item "System", proceed as described in the chapter on settings at user level DEFAULT (refer to 7.3 Menu on page 40).

To configure the system settings, proceed as described in the chapter on settings at user level DEFAULT (refer to 11.4 Menu Item System on page 83).

12.1.1 Volume

The volume of signals from the arm can be configured in increments of 1 to 10 in a configuration dialogue (refer to 7.3.4 Configuration Dialogues on page 43).

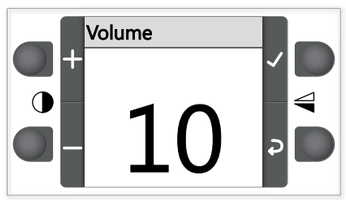


Figure 12-1 Volume

If the volume of the signals is too low and the area is very noisy, the user may not notice the alarm signals.

12.1.2 Audiovisual Signals

At user level OPERATOR, the user can switch the audiovisual signals on or off.

Deactivating audiovisual signals is not recommended. Deactivating audiovisual signals requires increased duty of care on the part of the user.

Key tone To switch the key tones on or off, proceed as described in the chapter on settings at user level DEFAULT (refer to 11.4.7 Audiovisual Signals on page 87).

LED The signals of the LED of the **Start/Stop** key can be switched on or off.

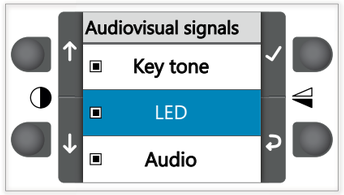


Figure 12-2 Audiovisual signals - LED

To switch the LED signals on or off, proceed as follows:

1. Navigate to the menu item “LED” using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The LED signals have been switched on or off.

Audio The signals of the alarm generator can be switched on or off.

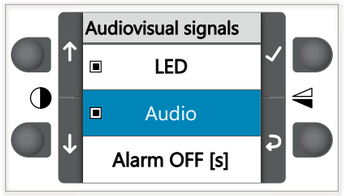


Figure 12-3 Audiovisual signals - Audio

To switch the signals of the alarm generator on or off, proceed as follows:

1. Navigate to the menu item “Audio” using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

The audio signals of the alarm generator have been switched on or off.

Alarm OFF [s] The duration of the alarm suspension can be configured from 15 s to 120 s.

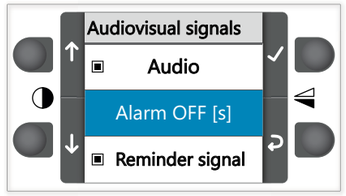


Figure 12-4 Audiovisual signals - Alarm OFF [s]

To change the duration of alarm suspension, proceed as follows:

1. Navigate to the submenu item ► "Alarm OFF [s]" using the softkeys [Up] and [Down].
2. Activate the selection using the [Confirm] softkey.

   The configuration dialogue “Time [s]” appears (refer to 7.3.4 Configuration Dialogues on page 43).

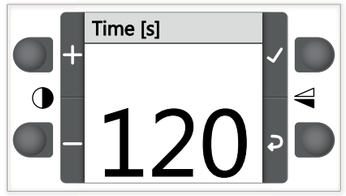


Figure 12-5 Configuration dialogue - Alarm OFF [s] - Time [s]

3. Configure the duration of alarm suspension.

Reminder signal The reminder signal for alarm suspension can be switched on or off.

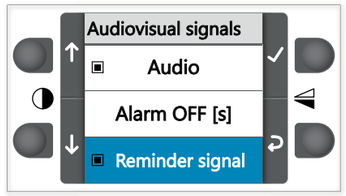


Figure 12-6 Audiovisual signals - Reminder signal

To switch the reminder signal on or off, proceed as follows:

1. Navigate to the menu item “Reminder signal” using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

12.1.3 Bluetooth

At user level OPERATOR the Bluetooth function can be enabled or disabled permanently.

To enable or disable the Bluetooth function, proceed as follows:

1. Navigate to the menu item “Bluetooth ON” using the softkeys [Up] and [Down].
2. Activate or deactivate the checkbox using the softkey [Confirm].

To enable or disable the Bluetooth function permanently, the change has to be saved (refer to 12.1.9 Storing the Configuration on page 97).

The Bluetooth function is enabled or disabled.

12.1.4 Usage Selection

At user level OPERATOR, the usage selection can be changed.

WARNING!

Jeopardized therapeutic success due to delayed therapy!

In the usage selection mode BASIC, the user cannot change a wrongly selected patient configuration in the start screen. Changing the patient configuration in the start screen is only possible after switching off the device for 30 s and re-starting the device.

► Pay close attention when selecting the patient class.

With factory settings, the arm starts in usage selection mode ADVANCED (refer to Table 10-1 Factory settings on page 74).

Only in usage selection mode ADVANCED, the user can change system settings, compression depth and compression rate (refer to 9.4.1 Configuring Therapy Settings on page 67). In usage selection mode BASIC, only the functions “Mode”, “Bluetooth” and “User level” can be selected.

To change a usage selection option, proceed as follows:

1. Navigate with the softkeys [Up] and [Down] to the required Usage selection option.

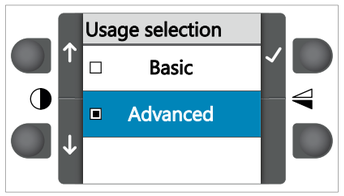


Figure 12-7 Usage selection

2. Activate the checkbox using the softkey [Confirm].

The usage selection has been changed.

The change in usage selection has to be saved in order to be active at the next start of the arm.

Usage selection mode BASIC and ADVANCED can be clearly distinguished from one another in terms of main screen layout.

The following illustration shows the main screen in usage selection mode ADVANCED. All four softkeys can be activated. A corresponding symbol is provided on the display for each softkey.

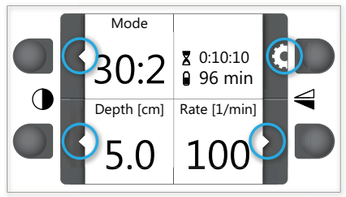


Figure 12-8 Main screen in usage selection mode ADVANCED

The following functions are available to the user in usage selection mode ADVANCED:

- Changing menu settings.
- Changing compression rate for therapy.
- Changing compression depth for therapy.
- Changing therapy mode.
- Activating all quick selection functions.

The following illustration shows the main screen in usage selection mode BASIC. Only the softkey [Mode] can be activated. A corresponding symbol is provided on the display for the softkey [Mode].

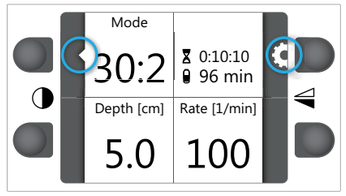


Figure 12-9 Main screen in usage selection mode BASIC

The following functions are available to the user in usage selection mode BASIC:

- Changing therapy mode.
- Activating all quick selection functions.

12.1.5 Changing Codes

The user can change the codes for the user levels DEFAULT and OPERATOR.

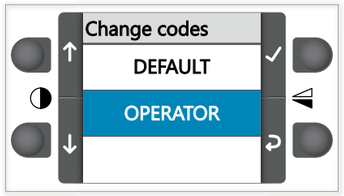


Figure 12-10 Changing Codes

To change the code for a user level, proceed as follows:

1. Navigate to the user level using the softkeys [Up] and [Down].
2. Confirm the selection using the softkey [Confirm].

   The display switches to the configuration dialogue for entering the 4-digit code.

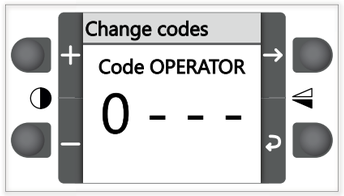


Figure 12-11 Changing codes - configuration dialogue

3. Navigate to a location of the code using the softkeys [Right] and [Left].
4. Set the number using the softkeys [Plus] and [Minus].
5. Confirm the code entered by pressing the softkey [Confirm].

The softkey[Confirm] can only be selected when the last digit of the code is highlighted.

Once the code has been confirmed, the display shows one of the following messages for 3 s*:*

- If the code is already in use:
  - “Invalid code”
- In the case of a new valid code:
  - “Code changed”

Write down the new code and store safely.

12.1.6 Language

The language of the system can be changed.

Figure 12-12 Language

To select a different language, proceed as follows:

1. Navigate to “Language” using the softkeys [Up] and [Down].
2. Activate the checkbox using the softkey [Confirm].

12.1.7 Patient Settings

At user level OPERATOR, the user can configure the therapy settings individually for up to three patient groups. When the start screen “Patient” is active (refer to 7.5.1 Start Screen Patient on page 45), the user has to select a configuration.

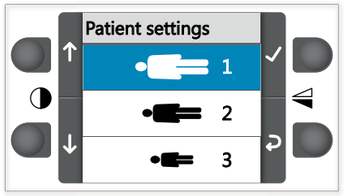


Figure 12-13 Patient Settings

To configure the patient settings, proceed as follows:

1. Navigate to the patient group using the softkeys [Up] and [Down].
2. Select the patient group using the softkey [Confirm].

The settings menu for the selected patient group appears.

Patient groups 1, 2 and 3

The following section describes individual modification of the therapy settings for the patient groups.

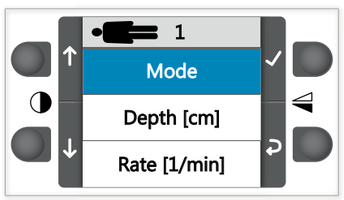


Figure 12-14 Therapy settings, patient group 1

The following instruction explains how to modify the therapy settings for patient group 1. Patient groups 2 and 3 can be modified accordingly.

To configure the therapy settings for patient group 1, proceed as follows:

1. Navigate to a therapy setting using the softkeys [Up] and [Down].
2. Activate the selection using the softkey [Confirm].

   The selection or configuration dialogue for the therapy setting appears (refer to 7.3.4 Configuration Dialogues on page 43).
3. Adjust the therapy setting in the selection or configuration dialogue.
4. Use the softkey [Back] to return to the therapy settings of patient group 1.
5. Navigate to another therapy setting using the softkeys [Up] and [Down].
6. Activate the selection using the softkey [Confirm].

   The selection or configuration dialogue for further therapy configuration appears (refer to 7.3.4 Configuration Dialogues on page 43).
7. Adjust the therapy setting in the selection or configuration dialogue.
8. Use the softkey [Back] to return to the therapy settings of patient group 1.
9. Return to the patient settings using the softkey [Back].

The therapy settings for patient group 1 have been configured.

12.1.8 Start Screen

At user level OPERATOR, the user can configure two start screens. These start screens appear first when the user switches on the arm. The display then shows the main screen.

The following start screens are available:

- Patient
- Mode

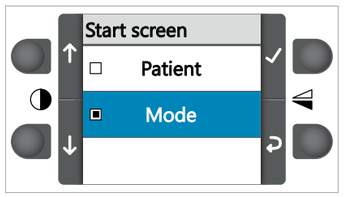


Figure 12-15 Settings “Start screen”

To change the start screens, proceed as follows:

1. Navigate to “Start screen” using the softkeys [Up] and [Down].
2. Activate the checkbox using the softkey [Confirm].

   The start screen is activated.
3. Navigate to another start screen using the softkeys [Up] and [Down].
4. Activate the checkbox using the softkey [Confirm].

   The next start screen is activated.

The start screens have been changed.

Multiple selection is possible. The user has to store changed settings, so that the start screens will appear in sequence the next time the arm is started (refer to 12.1.9 Storing the Configuration on page 97).

12.1.9 Storing the Configuration

So that the modified settings are retained the next time the arm is started, the user must save these changes.

To save the settings, proceed as follows:

1. Confirm the confirmation dialogue (refer to 7.3.3 Confirmation Dialogues on page 42).

The settings have been saved. The screen switches to the menu “System”.

If the user changes the therapy settings of the main screen (refer to 9.4 Therapy Settings on page 67), these changes are retained after the settings have been saved. The therapy settings are active in the main screen the next time the arm is started.

12.1.10 Exporting the Configuration

To transfer the modified settings to other **corpuls cpr** arms, the user can export these settings to the SD card.

The arm exports the following settings:

- Codes for the user levels DEFAULT and OPERATOR.
- Settings in the menu item "Ventilation".
- Settings in the menu item "System".

To export the settings, proceed as follows:

Prerequisite:

- An SD card is inserted in the SD card slot (refer to 6.3 Inserting the SD Card on page 28)

1. Confirm the confirmation dialogue (refer to 7.3.3 Confirmation Dialogues on page 42).

The settings have been exported. The screen switches to the menu “System”.

The arm does not export the therapy settings in the main screen.

The arm writes a file called SETUP.DAT to the master directory of the SD card.

If a file called SETUP.DAT already exists, the arm overwrites this file.

12.1.11 Importing the Configuration

The user can import exported settings from the SD card to other **corpuls cpr** arms.

A file called SETUP.DAT must be located in the master directory of the SD card.

To import settings, proceed as follows:

1. Confirm the confirmation dialogue (refer to 7.3.3 Confirmation Dialogues on page 42).

The settings have been imported. The screen switches to the menu "System".

SETUP.DAT overwrites existing settings with the imported settings.

In order to also use the imported settings after the arm is restarted, the user must save these settings (refer to 12.1.9 Storing the Configuration on page 97).

12.1.12 Change BT PIN

The user can change the PIN of the Bluetooth® module. The modification is performed in the same way as for the configuration dialogue for changing the user level code (refer to 12.1.5 Changing Codes on page 94).

After confirming the entry, the following message appears on the display:

- BT PIN changed

If the Bluetooth PIN has to be changed, the NFC chip in the corpuls cpr has to be overwritten.

12.1.13 Reset to Factory Settings

At user level OPERATOR, the user can reset the settings of the arm to factory settings (refer to 10 Reset to Factory Settings on page 74).

To reset settings to factory settings, proceed as follows:

1. Confirm the confirmation dialogue (refer to 7.3.3 Confirmation Dialogues on page 42)

The settings are reset to factory settings. The screen switches to the menu "System".

After resetting to factory settings, it is not necessary to save the settings.

When resetting to factory settings, the PINs for Bluetooth, OPERATOR and DEFAULT are reset.

When resetting to factory settings, the usage selection will be reset to "ADVANCED".

When resetting to factory settings, the list of paired devices will be deleted.

12.1.14 Update

The user can import updates of the arm software using the SD card (refer to 5.5.3 SD Card on page 16).

The update can only be installed if the SD card is inserted.

The update file must be named "cCPR-update.pck" and be located in the / update folder on the SD card.

NOTICE!

Cancellation of the update.

Can lead to irreparable failure of the arm.

- ► Do not switch off the arm while the update is in progress.
- ► The battery charging status must correspond to at least three lit LEDs.
- ► Do not remove the battery while the update is in progress.
- ► During the update, connect the arm to a power supply.

To install the update, proceed as follows:

Prerequisite:

- An SD card with a valid update file is inserted in the SD card slot (refer to 6.3 Inserting the SD Card on page 28)

1. Confirm the confirmation dialogue (refer to 7.3.3 Confirmation Dialogues on page 42).

   The system checks the update file.

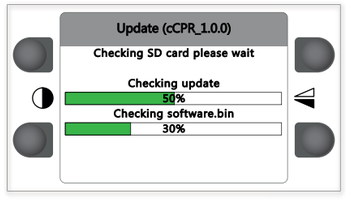


Figure 12-16 Update check

2. Start the update using the softkey [START].

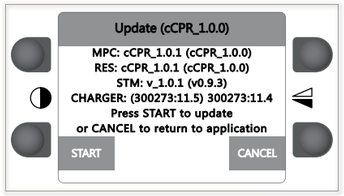


Figure 12-17 Update - version overview

To cancel the action, press softkey [CANCEL]. The arm performs a restart.

The update starts.

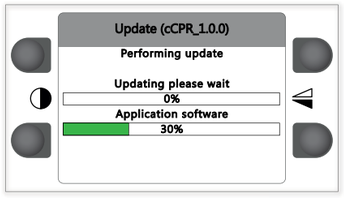


Figure 12-18 Update process

The display indicates that the update has been successful.

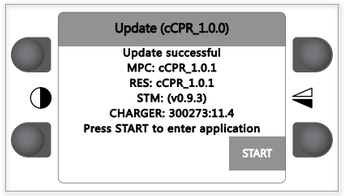


Figure 12-19 Update successful

The update has been imported.

3. Restart the arm using the softkey [START].

   The arm performs a restart.

After every update, a functional test must be carried out for the arm (refer to 16.4 Functional Test on page 118).

The following table shows the error messages possible during an update and describes:

- The causes of the fault.
- The possible consequences.
- The measures to be taken to eliminate the fault.

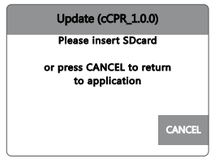
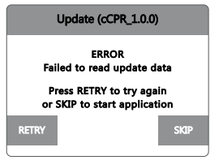
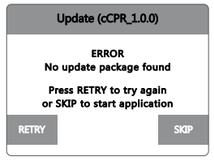
Content of the display	Cause	Conse-quences	Measure
	SD card not found	Update not possible.	Insert an SD card with an update file into the SD card slot.
	Update file read error	Update not possible.	Check the SD card and the update file.
	No update file found on the SD card	Update not possible.	Save the update file to the SD card.

Table 12-1 Update errors

13 Therapy and Transport with the Recboard

This chapter instructs the user on how to use the Recboard, Straps and the Fixation Ring for therapy and patient transport.

13.1 Therapy with the Recboard

Assembly of the arm and therapy using the Recboard corresponds to assembly and therapy using the Quadboard (refer to 9 Therapy on page 59). The Recboard can be used in four different positions underneath the patient. The following illustrations describe the four possible orientations.

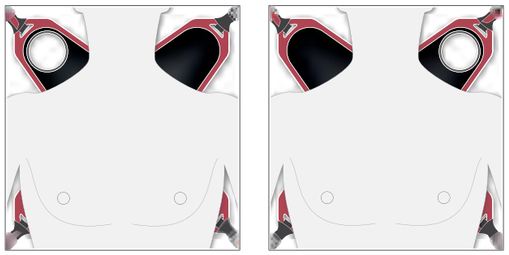


Figure 13-1 Recboard aligned above shoulders

In the case of obese patients, the manufacturer recommends aligning the Recboard above the shoulders. When aligning beside the thorax, the maximum thorax width of the patient is limited to 48 cm**.**

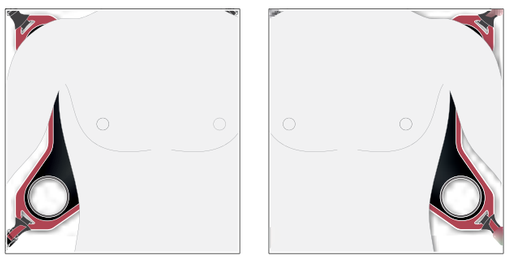


Figure 13-2 Recboard aligned beside thorax

The user is responsible for the appropriate alignment of the Recboard underneath the patient.

13.2 Transport with the Recboard

In combination with an appropriate transport device and patient securing system, it is possible to transport the patient with the Recboard while therapy is in progress.

An appropriate head fixation device must be used during transport.

The user is responsible for a sufficient fixation and has to use additional means of fixation, if necessary.

To transport the patient using the Recboard, proceed as follows:

Prerequisite:

- The patient has been positioned on the Recboard while therapy is in progress

1. Stop therapy (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70).
2. Position the patient together with the Recboard on the carrying device.

CAUTION!

Inadvertent commencement of therapy while repositioning the patient!

Can lead to patient or user injury.

► Do not press the **Start/Stop** key before the arm has been adjusted.

► Take special care to avoid unintended pressing of the **Start/Stop** key.

Grip and lift the Recboard with the patient using the hand loops of the attachment straps.

The user is responsible for choosing the appropriate method of positioning the patient with the Recboard on the carrying device in accordance with the type of carrying device used.

3. Check the arm and stamp positions and adjust where required (refer to 9.3.5 Adjusting the Arm on page 64) (refer to 9.3.6 Stamp Position Check on page 66).

   The arm is adjusted and the stamp is positioned above the therapy zone (refer to Figure 9-5 Adjusting the arm in the therapy zone on page 65)
4. Starting therapy (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70).
5. Secure the Recboard on the transport device using the safety straps.

Use the available recessed grips and eyelets at the carrying device.

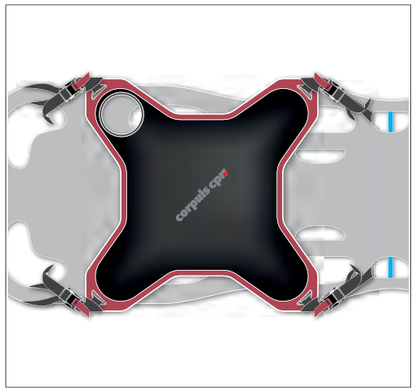


Figure 13-3 Recboard on carrying device

The user is responsible for proper and secure positioning of the Recboard on the transport device.

Recboard is fixated on the carrying device.

6. Secure the patient on the carrying device using the Straps and a suitable head fixation device (refer to 13.3.1 Securing the Patient with Straps on page 105).

The patient is ready for transport.

As long as there is no mechanical thorax compression, CPR must be performed manually.

Suitable carrying devices include standard commercial spine boards or stretchers, which are not part of the corpuls cpr system. The manufacturer recommends a flat spineboard for patient transport.

13.3 Patient Securing System

Use the fixation systems Straps and Fixation Ring only to secure adult patients.

The selection of the right securing system depends on the used carrying device.

- Use the Straps if:
  - The height of the patients is sufficient to have them secured on, among others, spineboards or stretchers.
- Use the Fixation Ring if:
  - Patients have to be secured on Recboard or Scoopboard for transport, among others, with rescue sheets or vacuum mattresses.

13.3.1 Securing the Patient with Straps

The user can secure the patient for transport using the Straps. This chapter instructs the user how the Straps work and how to use them.

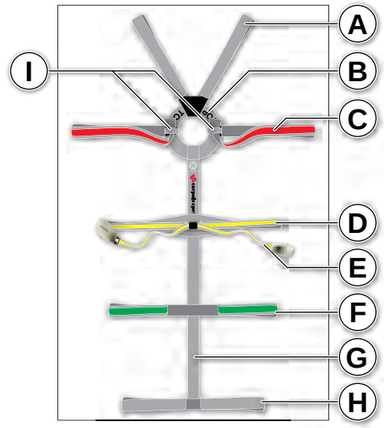


Figure 13-4 Straps

Item	Component	Description
A	Grey shoulder strap	Immobilises the patient in the shoulder area.
B	Chest ring	Allows therapy to be performed on the secured patient through the round opening.
C	Red chest strap	Immobilises the patient in the chest area.
D	Yellow pelvic strap	Immobilises the patient in the pelvic area.
E	Hand loops	Immobilise the hands of the patient near the body. The hand loops can be removed.
F	Green leg strap	Immobilises the patient in the leg area.
G	Sagittal band	Centers the Straps on the patient.
H	Grey foot strap	Immobilises the patient in the foot area.
I	Velcro fasteners	Secure the overlapping ends of the red chest strap.

Table 13-1 Straps

CAUTION!

No securing the patient due to damaged Straps!

Can lead to patient injury during transport, if the patient is secured with damaged Straps.

- ► Use the Straps only to secure the patient.
- ► Do not use the Straps as carrying or lifting equipment.
- ► Only use non-damaged Straps to secure the patient.

CAUTION!

Therapy stamp in movement!

Can cause crush injuries to the user.

► Do not reach under the moving stamp.

To attach the Straps, the user needs a helper. All steps should be performed simultaneously on both sides of the patient.

To secure the patient for transport using the Straps, proceed as follows:

Prerequisite:

- The patient has been positioned on a suitable carrying device
- The Recboard is placed between the carrying device and the patient and is secured to the carrying device using the straps

1. Place the Straps with the sagittal band (item G) on the middle of the patient's body.

The label TOP and the corpuls cpr lettering must face upwards.

2. Pause the therapy.
3. Position the chest ring (item B) beneath the stamp.
4. Continue therapy.
5. Position the grey shoulder strap (item A) at the head of the patient.
6. Position the grey foot strap (item H) at the feet of the patient.
7. Position the yellow pelvic strap (item D) at the pelvic area.
8. Place the grey shoulder strap (item A) on both sides over the shoulders of the patient.
9. Thread the grey shoulder strap (item A) through the lowest reachable recessed grip towards the pelvic area.
10. Guide the grey shoulder strap (item A) back over the shoulders of the patient and secure.
11. Position the grey foot strap (item H) and secure through the lowest reachable recessed grip.
12. Thread the red chest strap (item C) at the upper body under the armpits of the patient towards the head.
13. Thread the red chest strap (item C) through the highest reachable recessed grip and secure.

To prevent the protruding ends of the red chest straps entering the therapy area, use the Velcro fasteners.

14. Place the yellow pelvic strap (item D) over the pelvis of the patient and secure.
15. Place the green leg strap (item G) over the thighs of the patient and secure.
16. Re-tighten the grey shoulder strap (item A) and the red chest strap (item C).
17. Attach the head fixation device.
18. Immobilise the wrists of the patient with the hand loops (item E).

The patient is immobilised on an appropriate transport device and secured for transport.

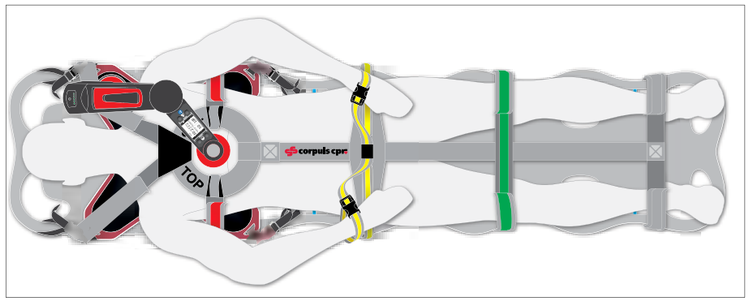


Figure 13-5 Securing the patient

The user is responsible for checking the correct placement of the Straps.

The user is responsible for checking the correct placement of the chest ring during therapy.

In the case of trauma, steady the patient's head with your hands until the head fixation device has been mounted.

13.3.2 Securing with the Fixation Ring

The following section explains the use of the Fixation Ring with the example of patient transport with a rescue sheet.

The manufacturer recommends a rescue sheet with a foot bag for patient transport.

The user needs 3 helpers to put the patient with the Recboard onto the rescue sheet.

To secure the patient for transport using the Fixation Ring, proceed as follows:

Prerequisite:

- The patient has been positioned on the Recboard while therapy is in progress
- The attachment straps are fastened to the Recboard, closed to form hand loops and freely accessible

1. Prepare the rescue sheet beside the patient.

The foot bag of the rescue sheet has to be beside the feet of the patient.

2. Pause the therapy.

3. Move the Recboard with the patient on to the rescue sheet by means of the hand loops.

The manufacturer recommends that the user and one helper grasp two hand loops each. The remaining helpers lift the head and the legs of the patient.

Patient with Recboard lies on the rescue sheet.

4. Position the Fixation Ring centrally on the thorax of the patient and hold to keep in place.

The opening of the Fixation Ring has to keep the therapy zone of the stamp free.

5. Check the arm and stamp positions and adjust where required (refer to 9.3.5 Adjusting the Arm on page 64) (refer to 9.3.6 Stamp Position Check on page 66).

   The arm is adjusted and the stamp is positioned above the therapy zone.

6. Continue therapy.

CAUTION!

Therapy stamp in movement!

Can cause crush injuries to the user.

► Do not reach under the moving stamp.

7. Open the hand loops of the attachment straps.
8. Fasten the Fixation Ring with the attachment straps of the Recboard.

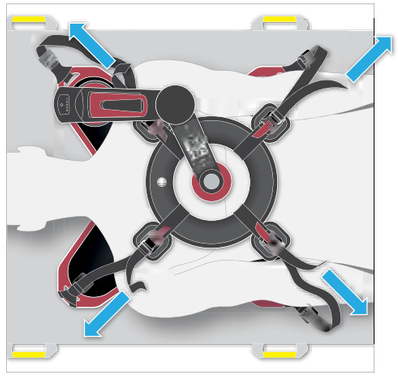


Figure 13-6 Fitting the Fixation Ring

The manufacturer recommends to keep the Fixation Ring in position while helpers pull tight the attachment straps at carefully and evenly.

The manufacturer recommends to secure the arms of the patient close to the body with the attachment straps.

The patient can no longer slip on the Recboard.

9. Put the feet of the patient into the foot bag.

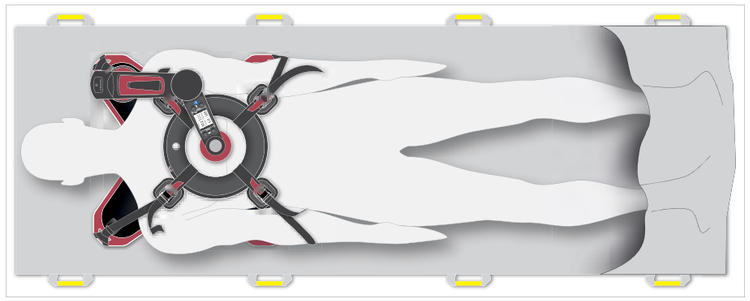


Figure 13-7 Patient secured with the Fixation Ring

The patient lies on the rescue sheet and is ready for transport.

The user is responsible for checking the correct placement of the Fixation Ring and the stamp position during therapy.

Only use the Fixation Ring during transport by rescue staff. The manufacturer recommends to remove the Fixation Ring for transport in a rescue vehicle. In this case, secure the Recboard on the stretcher without the Fixation Ring.

14 Therapy and Transport with the Scoopboard

This chapter instructs on how to use the Scoopboard for therapy and patient transport.

14.1 Warnings

NOTICE!

Damage due to tilting!

If the arm is assembled on the Scoopboard with no patient on it, the board can tilt over and damage the **corpuls cpr** and its accessories.

► Only assemble the arm of the **corpuls cpr** on a Scoopboard with a patient on it. When assembling without a patient, e .g. for daily functional testing, support the Scoopboard with your hand.

14.2 Therapy with the Scoopboard

Assembly of the arm on the Scoopboard corresponds to assembly on the Quadboard (refer to 9.3 Preparing Therapy on page 60). The Scoopboard has been developed specifically for use in combination with scoop stretchers.

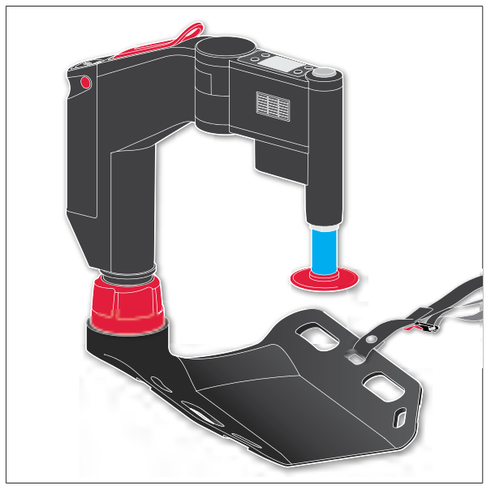


Figure 14-1 Scoopboard with stamp extension

WARNING!

Jeopardized therapeutic success due to delayed therapy!

To reach the required compression depth, there may be avoidable re-adjustments of the arm with the use of the Scoopboard.

► When performing therapy with the Scoopboard always insert the stamp extension.

The manufacturer recommends to remove the stamp extension when changing from therapy with the Scoopboard to another board.

To put the patient on the Scoopboard, the user needs several helpers.

To place the Scoopboard beneath the patient, proceed as follows:

1. The user and the helpers roll the patient on his side.
2. The Scoopboard is positioned at the back of the patient.

The Scoopboard can be used in only one position underneath the patient. The socket for the arm should be located besides the head and above the right shoulder of patient.

3. Roll back the patient together with the Scoopboard.
   The Scoopboard is positioned under the patient.
4. Assemble the arm.
5. Adjusting the arm and starting therapy (refer to 9 Therapy on page 59).

The patient has been positioned on the Scoopboard while therapy is in progress.

The user is responsible for choosing a suitable method to put the patient on the Scoopboard.

14.3 Transport with the Scoopboard

Due to the form of the Scoopboard, use with curbed carrying devices such as scoop stretchers is possible and allows transport during therapy in combination with the attachment straps and the Fixation Ring (refer to 5.5.8 Fixation Ring on page 20). In the following, the procedure for transport with a scoop stretcher and a vacuum mattress is explained.

To transport the patient using the Scoopboard, proceed as follows:

Prerequisite:

- The patient has been positioned on the Scoopboard while therapy is in progress
- The attachment straps are fastened to the Scoopboard and freely accessible

1. Pause the therapy (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70).

2. Position the Fixation Ring centrally on the thorax of the patient and hold to keep in place.

The opening of the Fixation Ring has to keep the therapy zone of the stamp free.

3. Check the arm and stamp positions and adjust where required (refer to 9.3.5 Adjusting the Arm on page 64) (refer to 9.3.6 Stamp Position Check on page 66).

   The arm is adjusted and the stamp is positioned above the therapy zone.

4. Continue therapy.

CAUTION!

Therapy stamp in movement!

Can cause crush injuries to the user.

► Do not reach under the moving stamp.

5. Fasten the Fixation Ring with the attachment straps of the Scoopboard (refer to 13.3.2 Securing with the Fixation Ring on page 107).

The manufacturer recommends to keep the Fixation Ring in position while helpers pull tight the attachment straps at carefully and evenly.

The manufacturer recommends to secure the arms of the patient close to the body with the attachment straps.

The patient can no longer slip on the Scoopboard.

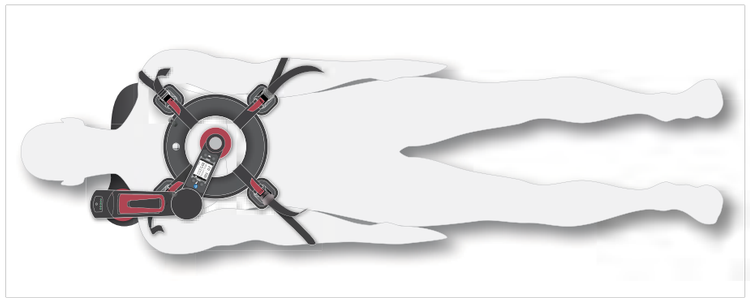


Figure 14-2 Patient secured with the Fixation Ring

6. Open the scoop stretcher and bring it together beneath the Scoopboard.
7. Close both halves of the scoop stretcher.
8. Secure the patient for transport with the securing system of the scoop stretcher.

The patient can be transferred during therapy to the vacuum mattress by means of the scoop stretcher.

The user is responsible for checking the correct placement of the Fixation Ring and the stamp position during therapy.

Only use the Fixation Ring during transport by rescue staff. The manufacturer recommends to remove the Fixation Ring for transport in a rescue vehicle.

As long as there is no mechanical thorax compression, CPR must be performed manually.

15 External Charger

15.1 Purpose of External Charger

The external charger allows to charge the battery of the **corpuls cpr**.

The manufacturer recommends to leave a replacement battery of the corpuls cpr in the external charger connected to a power supply. The performance of the battery is not impaired by this.

15.2 Intended Use of the External Charger

The following points must absolutely be observed to comply with the intended use:

- The user must have read and understood the user manual.
- The external charger is used exclusively to charge the battery of the **corpuls cpr**.
- The user exclusively uses the **corpuls cpr** AC adapter (refer to 5.5.1 AC Adapter on page 15) or the **corpuls cpr** DC connector cable (refer to 5.5.2 DC Connector Cable on page 15) to connect to a power supply.

The external charger can be operated either as permanently installed as wall-mounted charger or as stationary desktop charger.

When used as wall-mounted charger, make sure to correctly secure the device according to the supplied assembly instruction.

The use as wall-mounted charger is possible in mobile rescue vehicles as well as in closed rooms.

The external charger is intended for operation in a humid environment, corresponding to protection class IP X3. Do not expose the external charger to water splashes or -jets.

15.3 Operation Statuses

The operating status of the external charger is signalled via the status LED at the device. The state of charge of the battery can be read from the LEDs of the battery display.

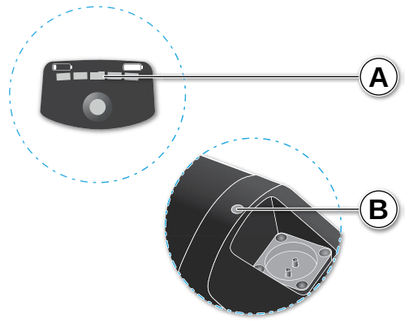


Figure 15-1 Operating status of the external charger

Item	Component	Description
A	LEDs of the battery display	The following displays are available: • Battery charging status. • Battery charging in progress. • Battery alarms.
B	LED of the status display	LED for displaying the status of the external charger.

Table 15-1 Operating status of the external charger

15.3.1 Operational Status

If the external charger is connected to a power supply without a battery inserted, a slow flashing of the LED in green signals the operational status of the device.

15.3.2 Error Status

An error in the external charger is signalled by an orange glow / flashing of the status display.

15.4 Charging with the External Charger

To charge the battery with the external charger, proceed as follows:

Prerequisite:

- The external charger is connected to a power supply intended for that purpose (refer to 6.2.2 Charging the Battery on page 25) and a visual check has made sure that the battery and battery shaft are clean.

1. Insert the battery.

   An acoustic signal is sounding.

The charging process starts automatically. The LEDs of the battery are flashing, the status display of the external charger flashes rapidly. The number of flashing LEDs at the battery corresponds to the current battery charging status.

If the battery is fully charged, the LED of the external charger is glowing permanently. The status display of the battery is deactivated.

Do not touch the charging contacts and the patient simultaneously.

If the power supply is interrupted during the charging process, the device emits several acoustic warning signals.

Do not cover the external charger during operation to prevent heat accumulation.

15.5 Battery Removal

The removal of the battery from the external charger is done analogously to the removal from the arm (refer to 6.2.3 Replacing the Battery on page 26).

15.6 Disconnecting from the Mains

To disconnect the external charger from the mains, the magnetic connector of the supply cable has to be removed. When installing the external charger, make sure that the connector is always easily accessible.

16 Functional Test and Maintenance

Regular functional testing and maintenance guarantee unrestricted function and operability of the device. This can prevent electrical and mechanical faults or identify them in a timely fashion.

16.1 Warnings

The following warnings inform the user of possible hazards for this chapter.

WARNING!

Limited functionality due to device malfunctions!

Can result in the device no longer functioning correctly.

- ► If faults cannot be repaired, contact your authorised service and sales partner.
- ► Do not use the device on patients.
- ► If necessary, take the device out of service.

The complete corpuls cpr system, comprised of an arm and the board used, must be taken into consideration during all test and maintenance measures.

16.2 Intervals

The following table provides an overview of the intervals at which to perform checks and maintenance measures.

Intervals	Functional Test	SC	Cleaning	Disinfection	Maintenance
Initial use	x				
Daily/ per shift	x				
After use*	x		x	x	
As necessary*	x		x	x	
Annually		x			x
In the case of a malfunction	x	x			

Table 16-1 Checking and maintenance intervals

*Manufacturer’s recommendation

16.3 Selftest

While powering up is in progress, the arm carries out a self-test. The functional test includes a complete system check of all critical components. If there are malfunctions during the system check, these are listed on the arm display (refer to Table 16-2 Functional test of the corpuls cpr on page 120).

16.4 Functional Test

The functional test is aimed at testing the device functions. If the correct result is obtained for all steps, the functional test is considered a pass. The manufacturer recommends logging the functional test using a checklist.

NOTICE!

Damage due to tilting!

Can tilt over without a patient if assembled, and damage the **corpuls cpr** and its accessories.

► Do not transport the **corpuls cpr** before it has been assembled. When assembling without a patient, e .g. for daily functional testing, support the board used with your hand.

Functional Test	Purpose	Measure	Correct result
Visual inspection	Determining damage to the **corpuls cpr** and its accessories.	• Check the complete **corpuls cpr** and its accessories for damage.	• No damage to the **corpuls cpr** and its accessories.
Bayonet lock and locking lever	Checking the functionality of all lockable parts of the arm.	• Assemble the arm with the battery inserted on the board (refer to 9.3.3 Assembling the Arm on page 61).	• The arm locks easily into the socket of the board.
		• Open the locking lever.	• The locking lever can be released.
		• Adjust the height and angle of the arm.	• The arm is easy to move and does not lock.
		• Close the locking lever.	• The locking lever can be closed. • All immobilisable parts of the arm are engaged. • The arm is securely connected to the board.

Functional Test	Purpose	Measure	Correct result
Battery charging status*	Verification of the battery charging status.	• Check the battery charging status (refer to 6.2 Check Battery on page 24).	• At least four LEDs of the battery display light up.
SD Card	Verification of the SD card.	• Check whether an SD card is inserted (refer to 5.5.3 SD Card on page 16).	• An SD card is inserted.
Switching on the arm	Starting the functional test.	• Insert the stamp (refer to 6.5 Inserting the Stamp on page 30). • Switch on the arm (refer to 9.3.4 Switching on the Arm on page 63).	• The self-test starts.
Self Test	The arm runs internal functional checks.	• None.	• The screen is illuminated. • The **Start/Stop** key flashes white and an acoustic signal is emitted. • No alarm messages are issued. • The main screen or a start screen appears.

Functional Test	Purpose	Measure	Correct result
Stamp position check and verification of the safety function	Verification of the function of the stamp position check.	• Open the locking lever.	• The LED of the **Start/ Stop** key lights up yellow. • On the display the symbol appears: 
		• Press the stamp gently inwards.	• The LED of the **Start/ Stop** key lights up green. • The display shows the main screen without any additional symbol.
		• Press the stamp firmly inwards.	• The LED of the **Start/ Stop** key lights up red. • On the display the symbol appears: 
		• Release stamp.	• The LED of the **Start/ Stop** key lights up yellow. • On the display the symbol appears: 
	Verification of the safety function	• Starting therapy (refer to 9.5.2 Starting, stopping/pausing and continuing Therapy on page 70).	• Therapy does not start. • The arm signals the alarm "Locking lever not closed". • On the display the alarm symbol appears: 
		• Close the locking lever.	• The alarm "Locking lever not closed" disappears. • The alarm symbol disappears.
Switching Off the Arm	Concluding the function test.	• Switch off the arm (refer to 9.6 Switching Off the Arm on page 71).	• No error message is issued. • The arm is switched off.

Table 16-2 Functional test of the corpuls cpr

*** An existing reserve battery must also be checked.**

16.5 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 **corpuls cpr** and loss of warranty claims at GS Elektromedizinische Geräte G. Stemple GmbH.

16.5.1 Technical Safety Check

The intervals for the technical safety check can be found in the overview of test and maintenance intervals (refer to 16.2 Intervals on page 117).

A technical safety check is mandatory for:

- Arm, including battery provided
- Quadboard
- Recboard
- Scoopboard

16.5.2 Repair and Service

In order to prevent transport damage when shipping the device, the original packaging must be used. If the original packaging is no longer available, use appropriate packaging. This appropriate packaging must guarantee safe transport of the device.

16.6 Cleaning and Disinfection

This chapter describes the reprocessing of the **corpuls cpr** and its accessories through cleaning and disinfection.

16.6.1 Warnings

CAUTION!

Touching hot parts of the corpuls cpr.

Can cause injury to the user as a result of burns.

► Ensure that the arm cools down sufficiently after use.

NOTICE!

Damage to the corpuls cpr as a result of incorrect cleaning and disinfection!

Can damage the material of the **corpuls cpr** and of its accessories, restrict their function, or nullify the effect of cleaning and disinfection.

- ► Do not immerse the **corpuls cpr** and its accessories in cleaning or disinfection liquids.
- ► Avoid simultaneous use of different cleaning and disinfection agents.
- ► Keep cleaning and/or disinfection agents separate. Do not mix.
- ► Before using a different disinfectant, clean the **corpuls cpr** and its accessories with a cleaning agent.
- ► Avoid changing the cleaning agent / disinfectant frequently.
- ► Do not sterilise or disinfect the **corpuls cpr** and its accessories in an autoclave, under pressure, with hot water, steam or gas.
- ► Store the **corpuls cpr** and its accessories in the carrying bag only if completely dry.

NOTICE!

Damage to the corpuls cpr as a result of using an incorrect disinfectant!

Can damage the material of the **corpuls cpr** and of its accessories or restrict their function.

- ► Do not use disinfectants based on the following active ingredients:
  - Alkyl amine compounds.
  - Phenolic compounds.
  - Halogen-releasing compounds.
  - Strong organic acids.

The following disinfectants from the DGHM list have been tested and recommended for effectiveness and material compatibility:

- Bacillol®, 30 tissues, 100%
- Dismozon® plus, 3.6% (w/w)
- Kohrsolin® extra, 6.0% (w/w)
- Mikrobac® forte 2% (w/w)
- Mikrobac® Tissues 100%

When using other disinfectants, make sure those belong to the same group of active substances.

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.

If there is a suspected risk of contamination of the device with dangerous pathogens, it may be necessary to process the insides of the device with disinfectants. In this case, please contact manufacturer.

16.6.2 Cleaning and Disinfection Procedure

To clean and disinfect the corpuls cpr and its accessories, proceed as follows:

Prerequisite:

- All surfaces of the **corpuls cpr** and its accessories that are to be cleaned and disinfected must be freely accessible

1. Remove visible and coarse dirt with disposable wipes.
2. Clean all surfaces with a disposable wipe soaked in disinfectant.
3. Disinfect all surfaces with an appropriate disinfectant.
4. Allow the disinfectant to dry completely.

*The **corpuls cpr** and its accessories have been cleaned and disinfected.*

Observe the application time of the disinfectant in accordance with the manufacturer's instructions.

16.6.3 Arm

The following section describes the preparation, cleaning and disinfection of the arm.

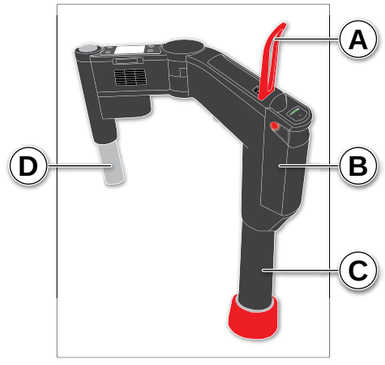


Figure 16-1 Cleaning the arm

To clean and disinfect the arm, proceed as follows:

1. Preparing the arm for cleaning and disinfection:
   a) Remove the arm from the board (refer to 9.8 Disassembling the Arm on page 73).
   b) Switch off the arm (refer to 9.6 Switching Off the Arm on page 71).
   c) Disconnect the arm from the power supply.
   d) Remove the battery (item B) (refer to 6.2.3 Replacing the Battery on page 26).
   e) Release the locking lever (item A).
   f) Remove the stamp (refer to 9.7 Removing the Stamp on page 72).
   g) Remove stamp extension, if inserted.
2. Extend both columns.
   a) Pull out the lifting column (item C).

CAUTION!

Touching hot parts of the corpuls cpr.

Can cause injury to the user as a result of burns.

► Ensure that the arm cools down sufficiently after use.

   b) Pull out the stamp column (item D).
3. Remove visible and coarse dirt from the arm (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
4. Clean and disinfect the surfaces of the arm (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
5. Allow the arm to dry.
6. Prepare the arm for functional testing:
   a) Insert stamp extension, if needed
   b) Insert stamp.
   c) Press the lifting column inwards.
   d) Close the locking lever.
   e) Insert the battery.
   f) Assemble the arm on the board.
7. Inspect the arm for visible damage and perform the functional test.

So that the stamp column is automatically retracted again, the arm must be switched on after cleaning and the locking lever then opened. The arm with inserted stamp only fits into the carrying bag with the stamp column retracted.

16.6.4 Stamp

To clean and disinfect the stamp, proceed as follows:

1. Remove visible and coarse dirt from the stamp (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
2. Clean and disinfect the surfaces of the stamp (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
3. Allow the stamp to dry.

4. Inspect the stamp for visible damage.

16.6.5 Stamp Extension

To clean and disinfect the stamp extension, proceed as follows:

1. Remove visible and coarse dirt from the stamp extension (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
2. Clean and disinfect the surfaces of the stamp extension (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
3. Allow the stamp extension to dry.
4. Inspect the stamp extension for visible damage.

16.6.6 Battery

To clean and disinfect the battery, proceed as follows:

1. Remove visible and coarse dirt from the battery (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
2. Clean and disinfect the surfaces of the battery (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
3. Allow the battery to dry.
4. Inspect the battery for visible damage.

16.6.7 Boards

To clean and disinfect the boards, proceed as follows:

1. Remove visible and coarse dirt from the boards (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
2. Clean and disinfect the surfaces of the boards (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
3. Allow the boards to dry.
4. Inspect the boards for visible damage.

If necessary, the straps of the boards must be cleaned separately in a washing machine and then disinfected. The manufacturer's cleaning and disinfection specifications are available at *http://www.pax-bags.de/service/download/***.**

16.6.8 Carrying Bags and Straps

The manufacturer's cleaning and disinfection specifications are available at *http://www.pax-bags.de/service/download/*.

16.6.9 External Charger

To clean and disinfect the external battery charger, proceed as follows:

1. Remove visible and coarse dirt from the external battery charger (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
2. Clean and disinfect the surfaces of the external battery charger (refer to 16.6.2 Cleaning and Disinfection Procedure on page 123).
3. Let the external battery charger dry.
4. Inspect the external battery charger for visible damage and perform the functional test.

Appendix

A 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 is described in the respective warranty 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.

The warranty does not cover wear parts, faults and damage as a result of improper use, incorrect setup or installation, extraneous causes such as transport damage, damage due to impact or jolts, or repairs and modifications carried out by an unauthorised third party.

The warranty claim shall also be void if unauthorised accessories are used, or if accessories or spare parts are used that were not provided by the manufacturer or an authorised sales and service partner. Software support (except updates) are not covered under the warranty.

In the event of a defect or a warranty claim, please contact an authorised sales and service partner or the manufacturer.
The manufacturer shall only accept responsibility for user and operating safety of the device if maintenance, technical safety checks, repairs, additions and re-installations were performed by the manufacturer itself or by persons specifically authorised by the manufacturer.
Additionally, the valid version in each case of the manufacturer’s general terms and conditions shall apply.

B Protection Rights and Patents

The device and certain accessories are protected by patents that are either pending and/or already granted. Consequently, possession or purchase of this device does not automatically confer licence to use this device with spare parts or accessories which, alone or in combination with this device, infringe applicable patents for this device or patents of individual components which are used with this device.

It is therefore not permitted to, e. g.

- dismantle parts of the device and use them for other purposes.
- replicate components or accessories.

Goods are mentioned in this user manual without any mention of any existing patents, samples or trademarks.
corpuls® is a registered trademark of GS Elektromedizinische Geräte G. Stemple GmbH.
® GS is a registered trademark of GS Elektromedizinische Geräte G. Stemple GmbH.

The device as well as some of its accessories may be subject to one ore more of the following, patent-protected inventions:

- U.S. patent N° 9,775,771
- U.S. patent N° 9,956,135
- and other patents.

C Approved Accessories, Spare Parts and Consumables

A list of approved accessories and consumables can be found at *https://corpuls.world/technische-mitteilungen/zugelassenes-zubehoer*. For further information, consultancy and sales, please contact your authorised sales and service partner.

D Disposal

Do not dispose of the **corpuls cpr** or the accessories in household waste. Please ask your local authorities for information on correct disposal of the **corpuls cpr** and the accessories or return them to the manufacturer.

Dispose of the packaging of the **corpuls cpr** by means of your local institutions e. g. recovered paper container, recycling centre, paper collection etc.

E Technical Specifications

Patient parameters	
Thorax height	14 cm to 34 cm
Maximum thorax width	No restriction*
Weight of the patient	No restriction

Table A-1 Technical specifications - patient parameters

*** When assembling the arm besides the head of the patient (refer to 13.1 Therapy with the Recboard on page 102).**

Therapy parameters	
Compression depth*	2 cm to 6 cm
	+/- 5 mm
Compression rate	80 1/min to 120 1/min
	+/- 2 1/min
Mode	30:2
	15:2
	cont.
Compression cycle (compression : release)	50 % : 50 %
	+/- 5 %

Table A-2 Technical Specifications - Therapy parameters

*** At a force greater than 600 N, the configured compression depth can deviate from the actual compression depth.**

Dimensions		
Arm	Height	45 cm
	Width	43 cm
	Depth	9 cm
Arm, assembled on the Quadboard	Height	46 cm
	Width	49 cm
	Depth	49 cm
Battery	Height	20 cm
	Width	7 cm
	Depth	6 cm
Stamp, long	Height	9.8 cm
	Diameter	8.0 cm

Dimensions		
Stamp, short	Height	3.8 cm
	Diameter	8.5 cm
Quadboard	Height	46 cm
	Width	46 cm
	Depth	13 cm
Recboard	Height	47 cm
	Width	47 cm
	Depth	3.5 cm
Scoopboard	Height	45.8 cm
	Width	34.7 cm
	Depth	8.5 cm
Quadboard carrying bag, filled to capacity	Height	55 cm
	Width	50 cm
	Depth	24 cm
External charger	Height	9 cm
	Width	8 cm
	Depth	28 cm

Table A-3 Technical specifications - dimensions

Weight	
Arm (including battery)	5.5 kg
Battery	0.8 kg
Stamp, long	50 g
Stamp, short	30 g
Quadboard	1.7 kg
Recboard	2.2 kg
Scoopboard	1.7 kg
Carrying bag, filled to capacity	12.0 kg
External charger (incl. battery)	1.4 kg

Table A-4 Technical Specifications - Weight

Storage and transport conditions		
Arm Quadboard Recboard Scoopboard	Temperature	-30 °C to 70 °C
	Humidity	97 %
	Air pressure	600 hPa to 1024 hPa

Storage and transport conditions		
Battery	Temperature	Min/max: -20 °C to 65 °C
		Typ. 10 °C to 35 °C
	Humidity	97 %
	Air pressure	600 hPa to 1024 hPa
External charger	Temperature	-40 °C to 70 °C
	Humidity	97 %
	Air pressure	600 hPa to 1024 hPa

Table A-5 Technical specifications - Storage and transport conditions

The arm is immediately operational after storage. When used outside the specifications, the running time may be limited.

Environmental requirements		
Arm Quadboard Recboard Scoopboard External charger	Temperature	-20 °C to 45 °C
	Transient temperature	-20 °C to 50 °C
	Humidity	95 %
	Air pressure	600 hPa to 1024 hPa
Battery	Temperature Discharge	-20 °C to 45 °C
	Temperature Charging	0 °C to 45 °C
	Transient temperature	-20 °C to 50 °C
	Humidity	95 %
	Air pressure	600 hPa to 1024 hPa

Table A-6 Technical specifications - operational conditions

Energy management and power output		
Internal power supply (battery)	Replaceable and chargeable lithium polymer (LiPo) battery.	
	Capacity	3100 mAh
	Voltage range	• Min. 24.0 V • Typ. 29.6 V • Max. 33.6 V
	Output current	4500 mA (for 500 ms)
		18 A (for 150 ms)
		30 A (for 0.06 ms)

Energy management and power output			
DC Connector Cable		Nominal voltage	12 V to 33 V
		Power consumption	120 W at 12 V/10 A
		Protection of the on-board power supply	15 A
		Length	2 m
AC adapter		Output power, max.	150 W
		Voltage, nominal	12 V
		Max. current	12.5 A
Battery charging time	Charging status:	From 0 % to 80 %	From 80 % to 100 %
	Battery charging time inserted in arm (without therapy) Operating temperature: 25 °C	approx. 1.75 h	approx. 0.5 h
	Battery charging time inserted in arm (without therapy) Operating temperature: 43 °C	approx. 3 h	approx. 1 h
	Battery charging time in external charger	approx. 1.5 h	approx. 0.5 h
Maximal number of charging cycles			300
Operating time of arm in battery operation		• Reset to factory settings • Rigid thorax • Compression depth: 5 cm • Compression rate: 100 1/min • Mode: 30:2	90 min
		• Reset to factory settings • Normal thorax • Compression depth 5 cm • Compression rate 100 1/min • Mode: 30:2	120 min
External charger		Voltage supply	• Min. 10.8 V • Max. 33.0 V
		Power consumption	120 W

Table A-7 Technical data - Energy management and power output

General specifications			
Display	Type		2.4 ″ Blanview TFT LCD with LED backlight
	Definition	horizontal	720 pixels
		Vertical	320 pixels

General specifications		
Volume	Operating volume	Max. 70 dB
	Volume of alarms	80 dB
Protection	Arm	IP54
	Battery	IP55
	External charger	IP33
Data interface		SD Card
Alarms		Audiovisual

Table A-8 Technical specifications - general specifications

The following table describes the acoustic alarm signals of the arm.

Characteristic of alarm signal	**High priority**		**Medium priority**		**Low priority**		**Reminder signal**
Number of tones of the tone pulse group	10		3		2		1
Pause between tone pulse groups	10 s		20 s		No repeat		60 s
Duration of a tone of the tone pulse group	90 ms		130 ms		190 ms		110 ms
Pause between the tones of the tone pulse group	1. - 2.	100 ms	1. - 2.	200 ms	1. - 2.	200 ms	n.a.
	2. - 3.	100 ms	2. - 3.	200 ms	n.a.		
	3. - 4.	290 ms	n.a.				
	4. - 5.	100 ms					
	5. - 6.	1000 ms					
	6. - 7.	100 ms					
	7. - 8.	100 ms					
	8. - 9.	290 ms					
	9. - 10.	100 ms					

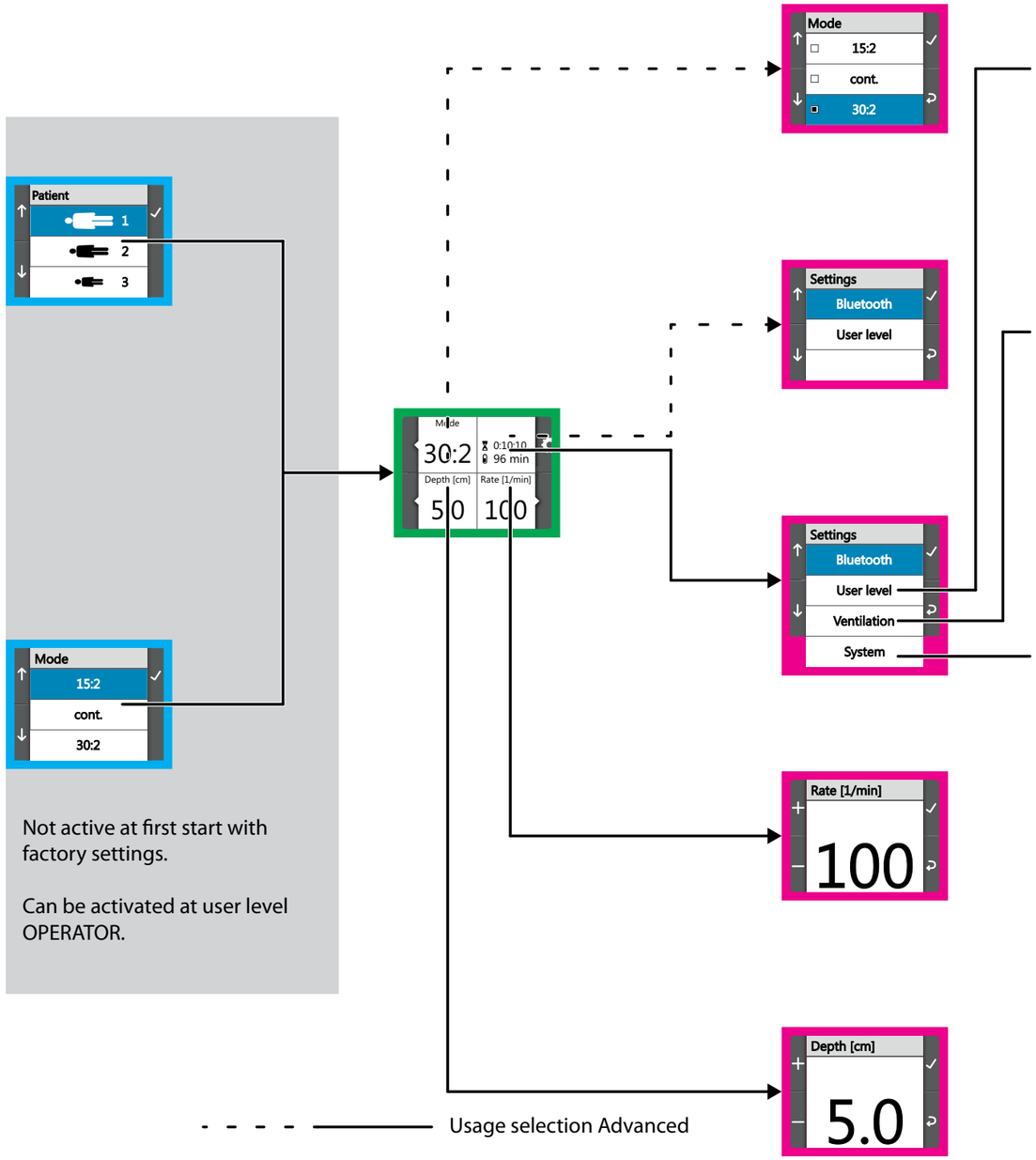
Table A-9 Technical specifications - alarm signal

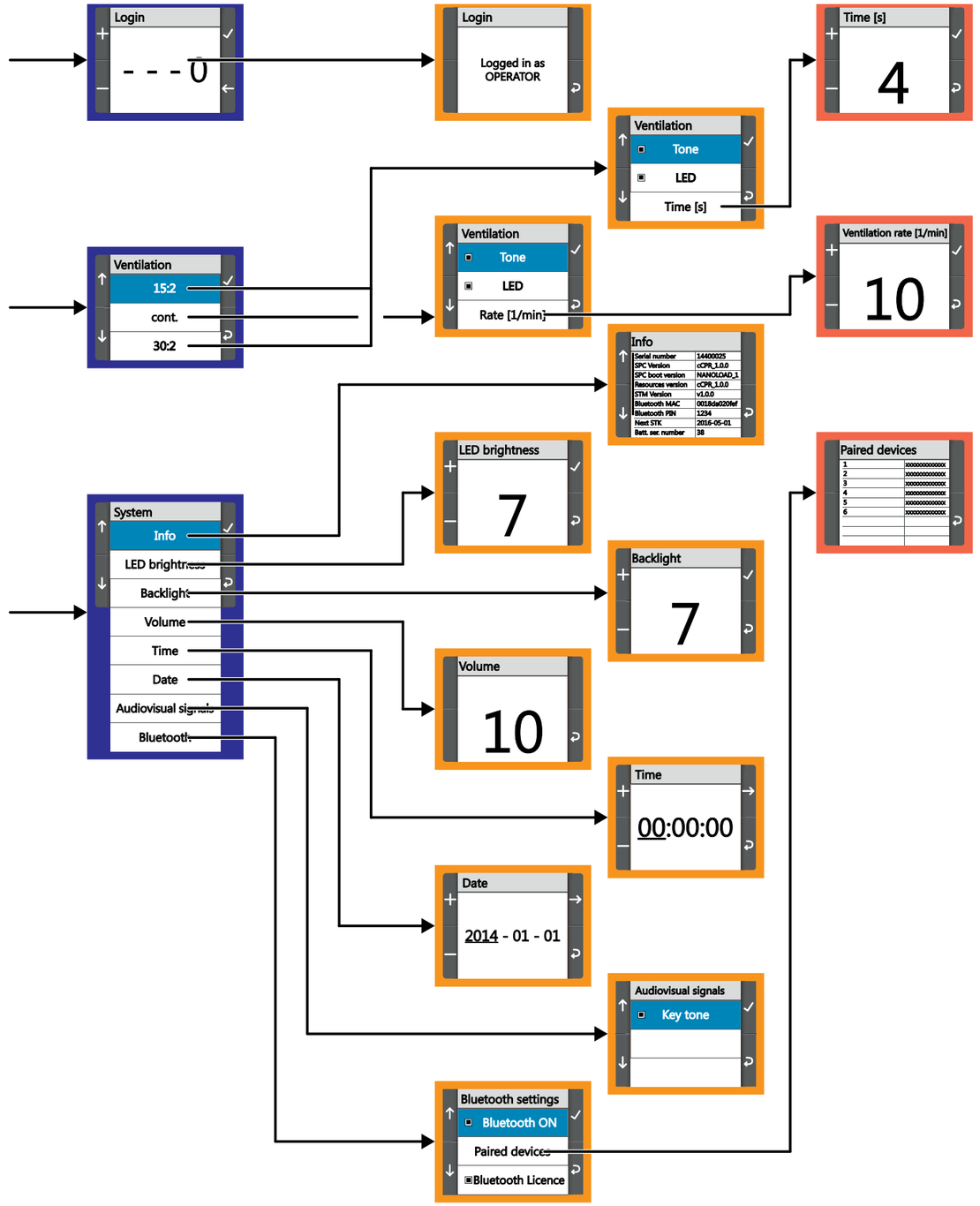
The following table describes the alarm signals of the LED of the **Start/Stop** key (refer to 5.2 Components of the Arm on page 11).

Characteristic of alarm signal		**High priority**	**Medium priority**	**Low priority**	**Reminder signal**
Colour of LED		Red	Yellow	Cyan	White
Duty cycle	Pulse duration	200 ms	800 ms	Permanent	20 ms
	Duration of pulse pause	250 ms	2000 ms	n.a.	60 s

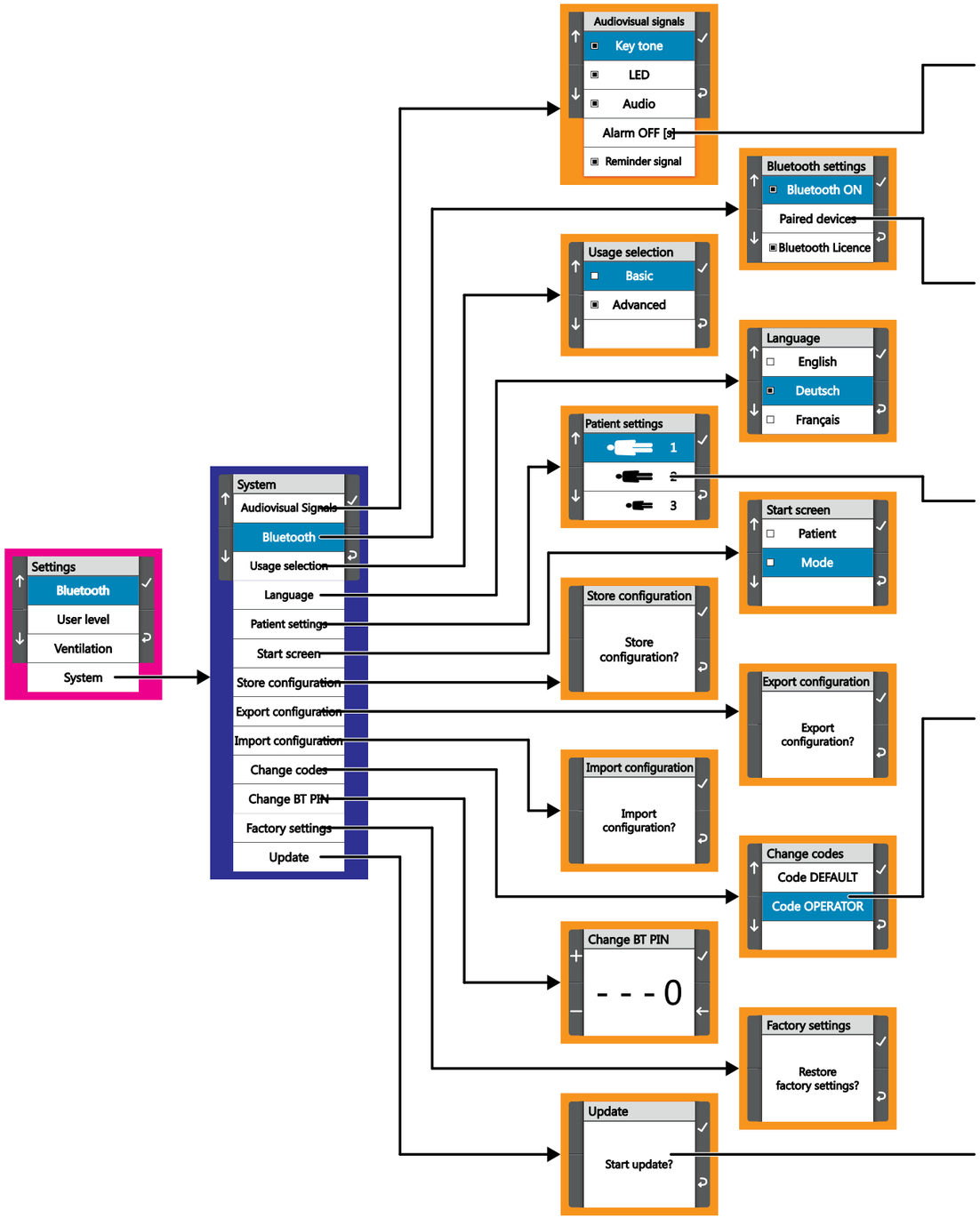
Table A-10 Technical specifications - LED alarm signal

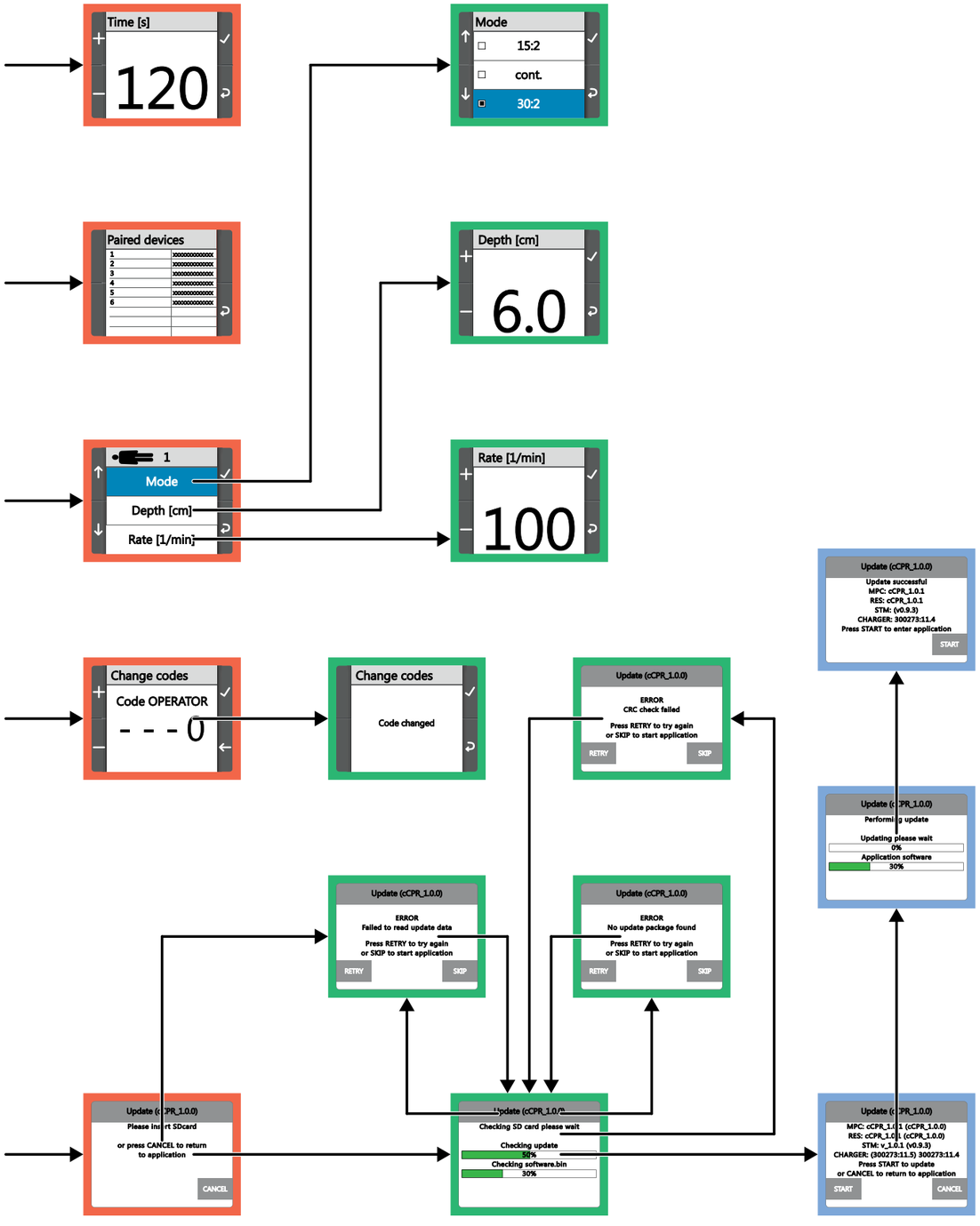
F Overview of Menu Navigation DEFAULT





G Overview of Menu Navigation OPERATOR





H Guidelines and Manufacturer's Declaration

Electromagnetic emission		
The **corpuls cpr** is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the **corpuls cpr** is operated in such an environment.		
Emission measurements	**Compliance**	**Electromagnetic environment - guidelines**
HF emissions in accordance with CISPR 11	Group 1	The **corpuls cpr** uses HF energy only for its internal function. The HF emission is very low. Therefore the risk of the **corpuls cpr** impairing the function of adjacent electronic devices is unlikely. The **corpuls cpr** is suitable for use in the following areas: all facilities, including those in residential areas that are directly connected to the public mains supply. Furthermore, the **corpuls cpr** is suitable for use in vehicles, on ships and, except for the external charger, on aeroplanes.
HF emissions in accordance with CISPR 25	ECE R-10	
HF emissions in accordance with CISPR 11	Class B	
Emission of harmonic oscillations in accordance with IEC 61000-3-2	Only to be used with a class A AC adapter	
Voltage fluctuations/flicker in accordance with IEC 61000-3-3	Only to be used with an AC adapter	

Table A-11 Electromagnetic emission

Electromagnetic interference immunity			
The **corpuls cpr** is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the **corpuls cpr** is operated in such an environment.			
Interference immunity tests	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidelines**
Electrostatic discharge (ESD) in accordance with IEC 61000-4-2	± 8 kV contact discharge ± 15 kV aerial discharge	± 8 kV contact discharge ± 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	± 2 kV for mains leads	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 ± 2 kV line to ground	± 1 kV line to line ± 2 kV line to ground	The quality of the power supply should correspond to that of a typical business or hospital environment.

Electromagnetic interference immunity			
Voltage dips, brief interruptions and fluctuations in the power supply in accordance with IEC 61000-4-11	2 cm 0 % U_T for 0.5/1 period 70 % U_T for 25/30 periods 0 % U_T for 250/300 periods	Only to be used with tabletop AC adapter	The **corpuls cpr** 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 50 Hz	30 A/m 50 Hz	Do not operate the **corpuls cpr** near an activated MRI unit (magnetic resonance imaging).
Note: U_T is the mains alternating voltage before application of the test level.			

Table A-12 Electromagnetic interference immunity part 1

Electromagnetic interference immunity			
The **corpuls cpr** is intended for operation in the electromagnetic environment indicated below. The operator or the user must ensure that the **corpuls cpr** is operated in such an environment.			
Interference immunity tests	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidelines**
n/a	n/a	n/a	Portable/mobile radio devices should not be used at a distance less than the recommended protection distance to the **corpuls cpr** including the leads. A protection distance of at least 0.3 m is recommended.
Conducted HF interference in accordance with IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz outside the ISM bands[a] 6 V_{eff} 150 kHz to 80 MHz within the ISM bands[a]	3 V_{eff}	$d = 1.2\sqrt{P}$

Table A-13 Electromagnetic interference immunity part 2

Electromagnetic interference immunity			
Radiated HF interference in accordance with IEC 61000-4-3	10 V/m 80 MHz to 2.7 GHz	10 V/m 80 MHz to 2.7 GHz	d = 0.6√P 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] 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] Interference is possible in the vicinity of devices that bear the following pictorial symbol: 
	27 V/m	27 V/m	380 MHz - 390 MHz TETRA 400
	28 V/m	28 V/m	380 MHz - 390 MHz TETRA 400
	9 V/m	9 V/m	704 MHz - 787 MHz LTE Band 13, 17
	28 V/m	28 V/m	800 MHz - 960 MHz GSM 800/900 TETRA 800 iDEN 820 CDMA 850 LTE Band 5
	28 V/m	28 V/m	1700 MHz - 1990 MHz GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1/3/4/25 UMTS
	28 V/m	28 V/m	2400 MHz - 2570 MHz Bluetooth WLAN 802.11 b/g/n RIFD 2450 LTE Band 7
	28 V/m	9 V/m	5100 MHz - 5800 MHz WLAN 802.11 a/n
Comment 1 At 80 MHz and 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.			

Electromagnetic interference immunity
[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 and 80 MHz and in the frequency range of 80 MHz and 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] It is theoretically not possible to precisely determine in advance the field strength of stationary transmitters such as e. g. base stations of mobile telephones and mobile terrestrial radio devices, amateur radio stations, and AM and FM radio and television transmitters. 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.

Table A-14 Electromagnetic interference immunity part 3

There is no limitation for the operation of the corpuls cpr in an electrically active environment. For operation in an extreme electrically active environment, consultation of the manufacturer is recommended.

Within the framework of intended use, the corpuls cpr, with the exception of the external battery charger, can be operated together with HF surgical devices pursuant to IEC 60601-2-2 Annex BB.4.

Recommended protection distances between portable/mobile HF communication devices and the device				
The **corpuls cpr** is intended for operation in an electromagnetic environment in which radiated HF interference is controlled. The operator or the user of the **corpuls cpr** can help to prevent electromagnetic interference by keeping minimum distances between portable/mobile HF communication devices (transmitters) and the **corpuls cpr**, as recommended below according to 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 outside the ISM bands d = 1.2√P	150 kHz to 80 MHz in the ISM bands d = 4.0√P	When used as a monitor	
			80 MHz to 800 MHz d = 4.0√P	800 MHz to 2.5 GHz d = 7.7√P
0.01	0.12	0.40	0.40	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

Recommended protection distances between portable/mobile HF communication devices and the device
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
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
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 and 2.5 GHz, an additional factor of 10/3 was used in order to reduce the likelihood that a portable/mobile communications device unintentionally brought into the patient area will result in interference.
Comment 3
These guidelines may not apply in all situations. Propagation of electromagnetic waves is influenced by absorption and reflection via buildings, objects and people.
Subject to technical modifications.

Table A-15 Recommended protection distances

WARNING!

Electromagnetic interferences due to too little protection distance!

Can lead to a reduction of the essential performance of the device.

► Use portable HF communication devices (including their accessories as e.g. antenna cable and external antennas) at a distance no less than 30 cm to the **corpuls cpr** and its accessories.

WARNING!

Electromagnetic interferences due to non-approved accessories!

Can lead to increased electromagnetic emission or to decreased interference immunity.

► Exclusively use approved accessories.

Bluetooth	
version	Bluetooth Stack 2.0
Bluetooth class (Emission/Transmission power)	Class 2
Frequency band	2.4 GHz
Effective radiated power according to IEC 60601-1-2	typ. 0 dBm = 1 mW
Modulation type	FHSS
Effective data rate	HF data rate: max. 704 kbps, Interface data rate: 9.6 kbps to 921.6 kbps

Table A-16 Bluetooth

I List of Abbreviations

Measuring units:

1/min	Frequency
A	Ampere
Ah	Ampere hour
dB	Decibel
h	Hour
s	Second
V	Volt
W	Watt

Abbreviations:

CPR	Cardio-pulmonary resuscitation
ECG	Electrocardiogramme
incl.	including
LED	Light-emitting diode
MPBetreibV	Medical Devices Operator Ordinance
n.a.	not applicable
RoPD®	Rosenberger Power Data Connector
SC	Technical safety check
SD™ card	Secure Digital Memory Card

J RED Declaration of Conformity

corpuls

RED Declaration of Conformity

We, **GS Elektromedizinische Geräte G. Stemple GmbH**
Hauswiesenstraße 26
D-86916 Kaufering

declare under our sole responsibility that the product:

Product name:	**Arm corpuls cpr**
Trade name:	**corpuls cpr**
Product description:	**Thorax compression device**
Article no.:	**09100**
from serial number:	**17400126**

to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the **Directive 2014/53/EU.**
The product is in conformity with the following standards and/or other normative documents:

HEALTH & SAFETY (Art. 3(1)(a)):	EN 60601-1:2006 + A1:2013 EN 62479:2010
EMC (Art. 3(1)(b)):	EN 301 489-1 V1.9.2 EN 301 489-17 V3.2.1
SPECTRUM (Art. 3(2)):	EN 300 328 V2.1.1

Leutkirch, 2017-07-04

Klaus Stemple
CEO / CTO

Signed for and on behalf of
GS Elektromedizinische Geräte G. Stemple GmbH

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