



# Clinical Practice Procedures: Resuscitation/Defibrillation

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<b>Date</b>	July, 2022
<b>Purpose</b>	To ensure a consistent procedural approach to defibrillation.
<b>Scope</b>	Applies to Queensland Ambulance Service (QAS) clinical staff.
<b>Health care setting</b>	Pre-hospital assessment and treatment.
<b>Population</b>	Applies to all ages unless stated otherwise.
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# Defibrillation

July, 2022

**Defibrillation** is the definitive treatment for life-threatening cardiac dysrhythmias, VF and pulseless VT, and is undertaken in parallel with advanced cardiac life support procedures.<sup>[1]</sup>

A direct current countershock, when applied through the chest produces simultaneous depolarisation of a mass of myocardial cells that may enable resumption of organised electrical activity.<sup>[2]</sup>

Depending on the type of defibrillator, shocks may be performed using:

- manual mode
- AED mode

Six types of defibrillator are used by the QAS:

- corpuls3
- LIFEPAK® CR2 AED
- ZOLL® X Series® (QAS Flight Paramedics)
- HeartStart FRx AED (QAS First Responders)
- SCHILLER FRED easyport AED (QAS Bike Response Paramedics)



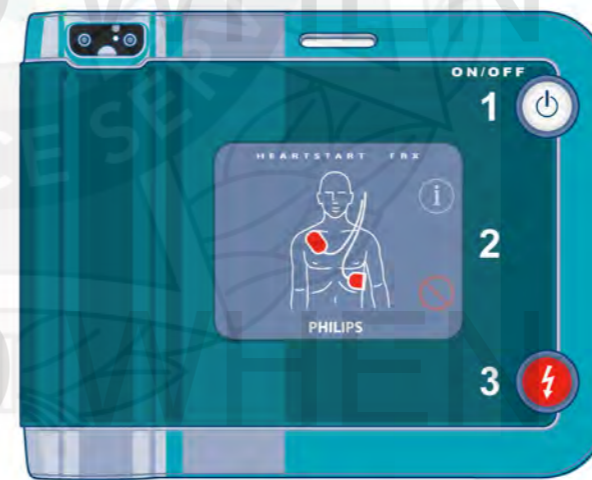
LIFEPAK® CR2 AED



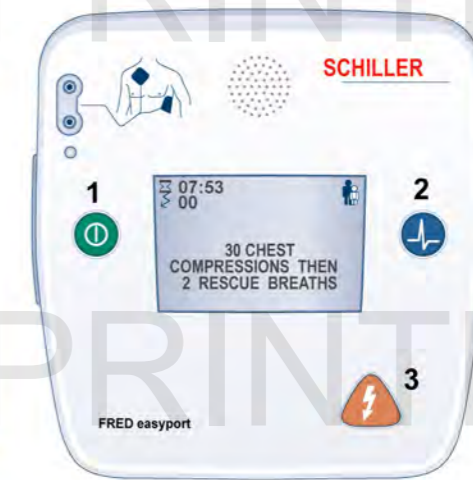
corpuls3



ZOLL® X Series®



HeartStart FRx



SCHILLER FRED easyport AED

## Indications

- VF
- Pulseless VT

## Contraindications

- Non shockable rhythms:
  - asystole
  - pulseless electrical activity
  - perfusing rhythms

## Complications

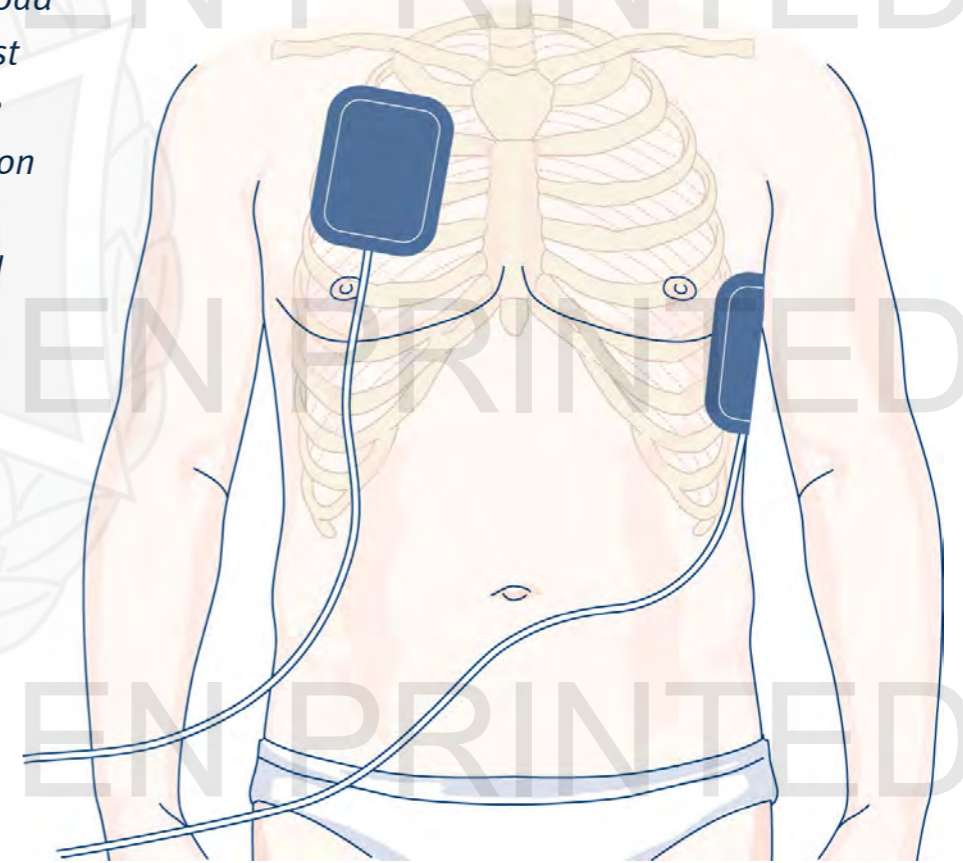
- Patient injury including burns:
  - Arcing between electrodes may occur if pads are incorrectly placed.<sup>[1]</sup>
  - Foreign bodies (including cardiac leads) between the pads and patient
  - Pads with insufficient or degraded conductant<sup>[1]</sup>
- Explosion:
  - Discharge of the shock could initiate an explosion if there is a combustible gas or fluid in the vicinity.<sup>[2]</sup>
- Transmitted shock to the operator or bystanders<sup>[3]</sup>

## Procedure – Defibrillation

1. Prepare the patient and skin for electrode placement (*refer to additional information*)
  - Ensure non-conductive environment
  - Ensure non-explosive environment
  - Ensure no-contact environment
  - Expose chest: shave, clean, dry area to ensure good skin contact between defibrillation pads and the skin
  - Remove monitoring electrodes if they are obstructing defibrillation pads.
2. Position defibrillation electrodes in the anterior-lateral position (all patient ages). Anterior-posterior electrode placement may be considered if defibrillation electrodes are at risk of overlapping (paediatric patients).

*\* In females defibrillation pad placement over the breast may increase impedance and decrease defibrillation efficacy. The positive defibrillation pad should be placed lateral to, or underneath the breast tissue in large breasted women.*


**NOTE:** Authority to defibrillate in an aircraft must be obtained from the pilot prior to commencing defibrillation.

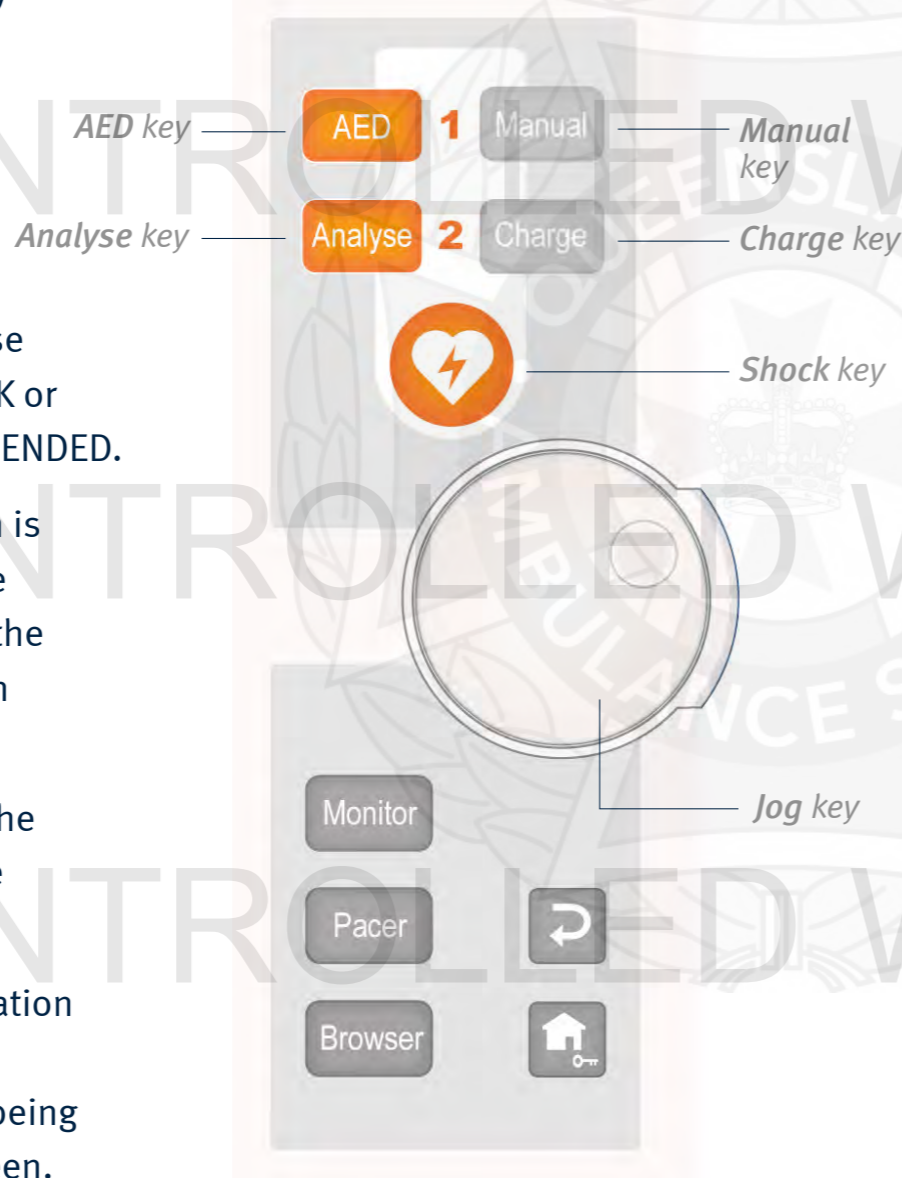


Anterior-lateral defibrillation pad placement


*corpuls<sup>3</sup>: For comprehensive instruction refer to the corpuls<sup>3</sup> operating instructions.*

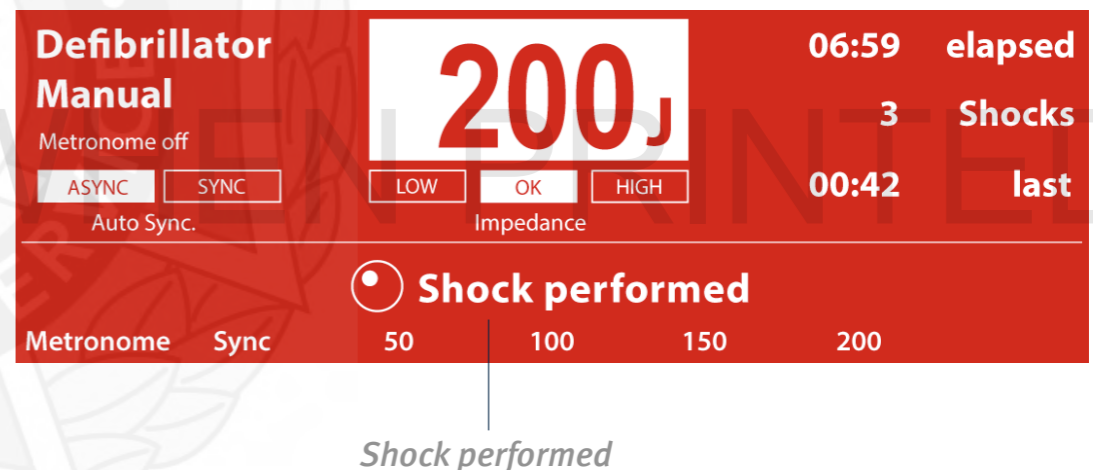
### Automatic external defibrillation (AED) mode

- To start the AED mode, press the **AED** key. To change to AED mode when the defibrillator is in manual mode, press the **AED** key.
- Attach corPatcheasy defibrillation electrodes to the patient.
- Press the **Analyse** key to initiate analysis. Do not touch or move the patient.
- After analysis of the ECG the defibrillator will advise either DELIVER SHOCK or SHOCK NOT RECOMMENDED.
- If a shockable rhythm is detected, you will see DELIVER SHOCK and the defibrillator will begin charging to 200 J.
- Once charged, hold the  key to deliver the shock to the patient.
- Confirm that defibrillation has occurred by SHOCK PERFORMED being displayed on the screen.



### Manual external defibrillation mode

- To start in manual mode, press the **Manual** key. To change to manual mode when the defibrillator is in AED mode, press the **Manual** key.
- Select the required energy level with the flashing jog dial or via the soft keys, confirm the joule setting by pressing the jog dial.
- Press the **Charge** key to charge the defibrillator.
- Once charged, hold the  key to deliver the shock to the patient.
- Confirm that defibrillation has occurred by **Shock performed** being displayed on the screen.



**NOTE:** If clinicians are unclear regarding the presenting cardiac rhythm the corpuls<sup>3</sup> **Analyse** function should be immediately used.

## Procedure – Defibrillation

### ZOLL® X Series®:

For comprehensive instructions refer to the ZOLL® X Series® operating instructions.<sup>[4]</sup>



Defibrillator default energy settings (both Auto & Manual modes)	
Adult patients	
Shock 1	120 J
Shock 2	150 J
Shock 3	200 J
Paediatric patients (< 25 kg)	
Shock 1	50 J
Shock 2	70 J
Shock 3	85 J

Select Energy button

### Manual external defibrillation mode

1. Press the green power button to turn the unit on.
2. If defibrillation electrodes are not making good contact with the patient's skin and the pad selected is ECG lead, the unit issues the message **Check Therapy Electrodes.**
3. Press the **Select Energy** arrows up or down to desired level (refer to Careflight Physician for joule settings).
4. Press **Charge** to charge the defibrillator – a charging message displays at the bottom of the screen, and a distinctive charging tone sounds indicating that the unit is charging.
5. Press and hold the red shock button to deliver the shock.

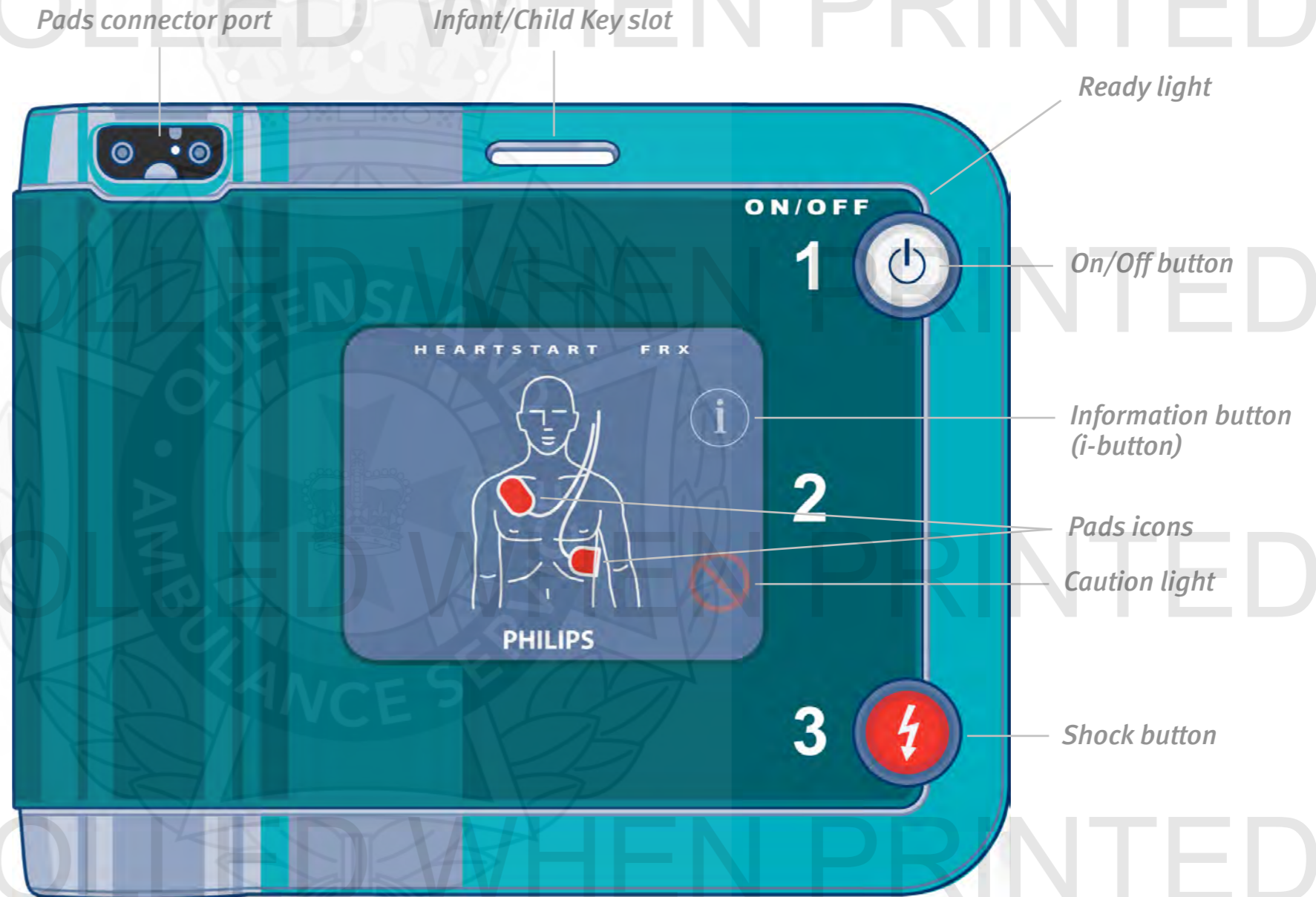
**NOTE:** If clinicians are unclear regarding the presenting cardiac rhythm the ZOLL® X Series® ANALYSE function should be immediately used.



**HeartStart FRx AED:**

*For comprehensive instruction refer to the HeartStart FRx AED operating instructions.<sup>[5]</sup>*

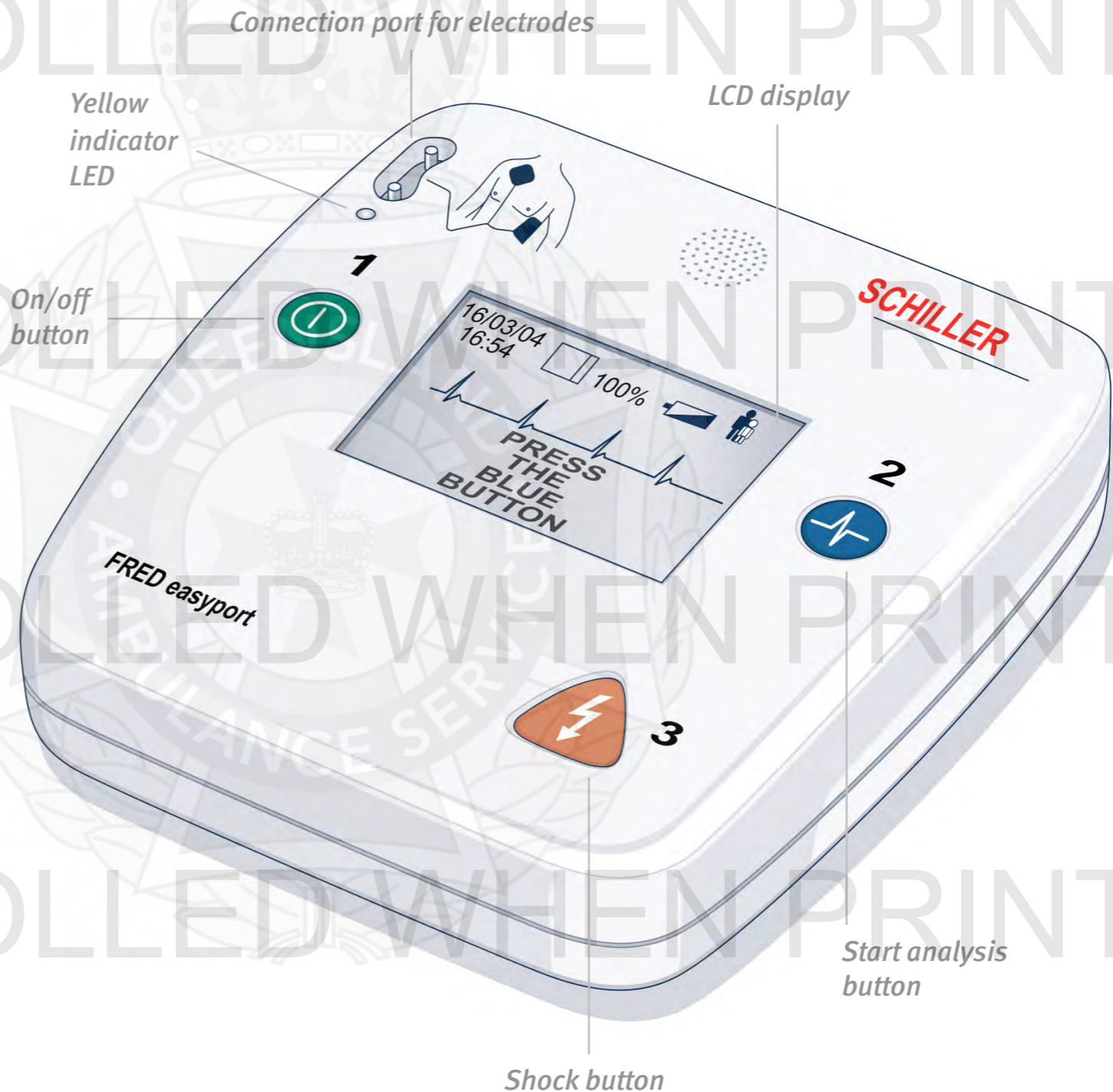
1. Press the green on/off button.
2. Follow the voice and visual instructions to position the pads.
3. As soon as the HeartStart FRx detects the pads are attached to the patient, it begins analysing the rhythm.
4. If a shock is advised the orange **SHOCK** button flashes and the HeartStart FRx instructs you to press the flashing orange button.
5. If a shock is not advised, the blue i-button comes on solid, to show that it is safe to touch the patient and the HeartStart FRx instructs you to perform CPR.
6. Once a shock is delivered the HeartStart will instruct you it is safe to touch the patient and to begin CPR.



### SCHILLER FRED easyport AED:

*For comprehensive instruction refer to the SCHILLER FRED easyport AED operating instructions.*

1. Press the green on/off button.
2. Follow the voice and visual instructions to position the defibrillation electrodes on the patient's chest.
3. Connect the electrode cable to the device. The yellow electrode indicator LED will go out as soon as the device is able to identify an acceptable electrode resistance.
4. Follow the prompts to start analysis by pressing the blue button.
5. If a shock is advised, the orange shock button will flash and the SCHILLER FRED easyport will instruct you to press the shock button.
6. If a shock is not advised, the SCHILLER FRED easyport will instruct you to perform CPR.
7. Once a shock has been delivered, the SCHILLER FRED easyport will instruct you to recommence CPR.





### LIFEPAK® CR2 AED:

The use of this AED is not restricted to trained personnel as voice prompts guide the operator. Allowing the use of AEDs by individuals without prior formal training can be beneficial and may be lifesaving, however training is recommended.

**This AED is designed to be used on adult or child patients, and should only be applied to patients who are unresponsive and not breathing normally.**

*For comprehensive instructions refer to the LIFEPAK® CR2 operating instructions.*

1. Open the lid to turn on the defibrillator. The defibrillator guides the operator through the appropriate steps with voice prompts.

**Note:** *If the defibrillator does not turn on within approximately 5 seconds or if the lid is missing, simply press the **on/off button**.*

2. Remove clothing (including undergarments) from the patient's chest. Quickly shave chest hair in the area where the defibrillation pads will be placed. If the chest is dirty or wet, wipe the chest clean and dry. Remove any medicine patches from the patient's chest.
3. If the patient is a child less than 8 years old or who weighs less than 25 kg, press the **CHILD MODE button** to enter child mode. To switch back to adult mode, press the **CHILD MODE button** again. If there is any doubt about age or weight, it is acceptable to use the device in adult mode. The same defibrillation pads are used for either adult and child patients.



## Procedure – Defibrillation

4. Pull the **red handle** to reveal the defibrillation pads.

5. Pull the loops on the defibrillation pads to peel the pads from the tray.

6. Apply the defibrillation pads to the patient's bare chest exactly as shown in the pictures on the pads.

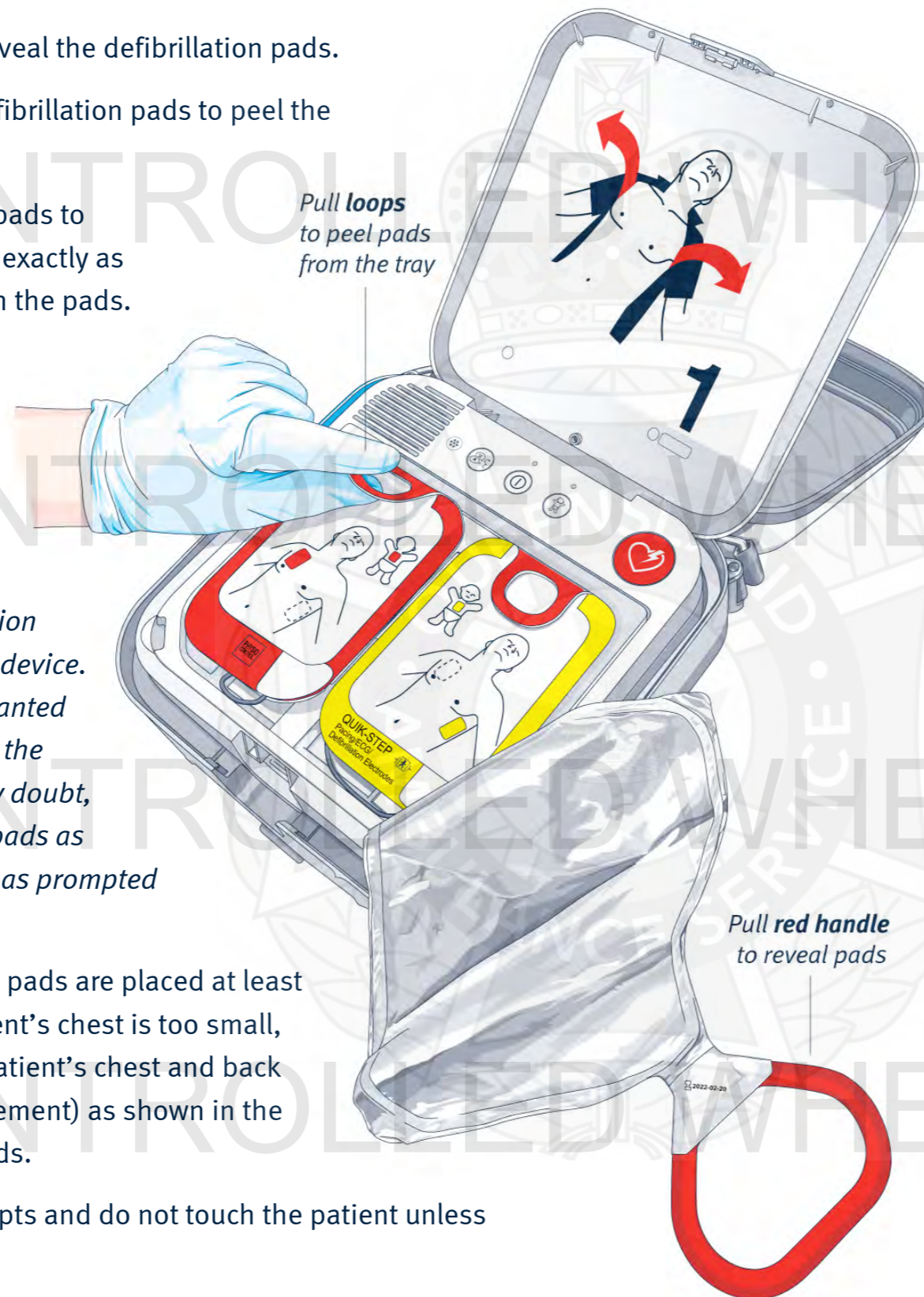
It is essential to press the defibrillation pads firmly so that the pads completely adhere to the patient's chest.

**Note:**

*Avoid placing defibrillation pads over an implanted device. An indication of an implanted device is a protrusion in the chest skin. If there is any doubt, place the defibrillation pads as instructed and continue as prompted by the AED.*

7. Ensure the defibrillation pads are placed at least 2.5 cm apart. If the patient's chest is too small, place the pads on the patient's chest and back (anterior/posterior placement) as shown in the child pictures on the pads.

8. Listen to the voice prompts and do not touch the patient unless instructed to do so.



9. If the AED ECG analysis determines that a shock is indicated, the voice prompts will instruct “*Everyone CLEAR*”, “**PRESS FLASHING BUTTON**”. Press the flashing shock button to deliver a defibrillation shock.

10. Do not touch the patient while a shock is being delivered, then continue to follow the voice prompts.

11. The defibrillator will instruct the operator to begin chest compressions, and voice prompts guide hand placement and a metronome guides compression rate and ventilations. If, for whatever reason, the operator is unable or reluctant to provide ventilations (either mouth to mouth resuscitation or with appropriate ventilation equipment), the operator can focus on performing good quality chest compressions until assistance or airway equipment is available.

12. Continue to follow the voice prompts and provide chest compressions or defibrillation shocks as instructed.

**Information for recommissioning the AED after use are provided in the Operating Instructions.**

## Additional information

### *Defibrillator pad placement*

- Antero-lateral pad position is the position of choice for initial pad placement.
- The anterior pad is placed to the right of the sternum below the clavicle. Ensure the lateral pad is positioned sufficiently laterally on the mid-axillary line, and centred on the V6 location immediately below the left armpit.
- Antero-posterior positioning is an acceptable alternative to antero-lateral. Place the anterior pad on the left precordium, immediately below the left nipple or breast tissue, and the posterior pad just below the left scapular to the left of the spine.
- If the patient has an implantable medical device (implanted pacemaker/defibrillator) the defibrillation pad must be placed at least 8 cm away. Consider antero-posterior placement of the defibrillation pads.
- In cases where a patient has been defibrillated several times (i.e. 3 cycles) and if the patient remains in a shockable rhythm, clinicians should consider quickly replacing the defibrillation pads with fresh defibrillation pads. When replacing the defibrillation pads, if appropriate, consider placing the defibrillation in the anterior/posterior orientation if the initial orientation was anterior/lateral (or vice versa).

### *Joule settings*

- Manual monophasic joule settings for adults and children  $\geq 6$  years is 200 J (all shocks).
- Manual joule settings for children  $< 6$  years:
  - All shocks at 4 J/kg
  - Round up the energy required to the next highest setting on the defibrillator.

## Safety

### *Ensure a non-conductive environment:*

- Remove conductive items in the vicinity of the patient AND/OR the defibrillator
- Wipe the chest dry of water, sweat, blood, excess gel, vomit

### *Ensure a non-explosive environment:*

- Do not defibrillate in the vicinity of petrol, LPG, or other such flammable materials.
- Minimise the risk of fire by removing oxygen therapy at least 1 metre away. Mechanical ventilator circuits can remain attached.

### *Ensure no contact:*

- No person is to be in contact with the patient at time of defibrillation.
- Have only one clinician responsible for defibrillation. They must check no contact and shout loudly 'All clear!' prior to defibrillation.
- Ensure there is no contact between the patient and the ambulance vehicle prior to defibrillation. (Place blankets over side arms of stretcher and pillows under the feet if necessary.)

### *Ensure no movement:*

- Rhythm analysis may be improved by stopping the ambulance where appropriate.

**NOTE:** Authority to defibrillate in an aircraft must be obtained from the pilot prior to commencing defibrillation.

## Additional information *(cont.)*

### *Defibrillation pad removal*

- If **removal** of the defibrillation pads is required, the following procedure must be employed:
  - Each individual defibrillation pad should be removed with two hands.
  - Loosen one side of the defibrillation pad by gently separating the pad's contact with the patient's skin.
  - Peel the defibrillation pad back over itself at 180 degrees, using the other hand to support the skin where required.
  - Defibrillation pads should be removed in the direction of hair growth where possible.
  - Gentle handling of the patient's skin is required in the very young, older patients and in patients where skin integrity is questionable.

