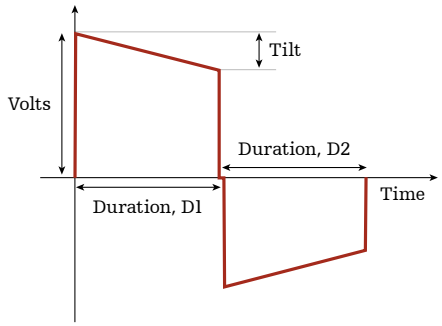
SCOPE™ Biphasic escalating waveform

History

Early external defibrillators used selectable energy levels that were set by the attending physician. The physician not only needed to estimate impedance based on a specific patient, but also needed to increase the energy level if defibrillation was not initially successful. In addition, the monophasic waveforms used energy levels up to 360 Joules to defibrillate effectively.

Biphasic waveforms

Biphasic waveforms, which were initially developed for use in implantable defibrillators, have become the standard in public access defibrillators. Importantly, many studies have shown that biphasic waveforms defibrillate successfully at lower energies because biphasic waveform technology allows the waveform to be adapted for different patient impedances.[1] For any particular energy level there are four primary variables for the wave shape: voltage, tilt and the duration of each of two phases.



Manufacturers of public access defibrillators have adopted different strategies for biphasic waveforms, adjusting one or more of the main variables to compensate for patient impedance. The various approaches are shown in the following table.

Waveform	D1	D2	Voltage	Tilt
HeartSine SCOPE	Variable	Variable	Variable	Variable
Cardiac Science STAR[2]	Variable	Fixed	Variable	Variable
LIFEPAK[3]	Variable	Variable	Variable	Variable
Philips SMART[4]	Variable	Variable	Fixed	Variable
ZOLL Rectilinear Biphasic[5,6]	Fixed	Fixed	Variable	N/A

SCOPE waveform

SCOPE (Self Compensating Output Pulse Envelope) is HeartSine's proprietary low-energy, biphasic waveform. Unlike the technology used by other manufacturers, the HeartSine SCOPE waveform adjusts all four variables for all impedances in the operating range and uses an escalating energy protocol to optimize the efficacy of the HeartSine samaritan PAD.

Because biphasic waveforms are adapted for varying patient impedance, the range of patient impedance over which the device operates is significant. As shown in the table below, the SCOPE waveform can deliver a shock over a wide impedance range (20-230 ohms) without a significant loss of energy—another advantage of the HeartSine SCOPE technology.

Waveform	Min Impedance	Max Impedance
HeartSine SCOPE	20 Ohms	230 Ohms
Cardiac Science STAR[2]	25 Ohms	175 Ohms
LIFEPAK[3]	10 Ohms	300 Ohms
Philips SMART[4]	25 Ohms	180 Ohms
ZOLL Rectilinear Biphasic[5,6]		
AED 3	10 Ohms	300 Ohms
AED Plus	0 Ohms	300 Ohms

References

1. Kette F, Locatelli A, Bozzolaa M, et al. Electrical features of eighteen automated external defibrillators: A systematic evaluation. *Resuscitation*. 2013;84:1596–1603.
2. *User's Guide, Cardiac Science Powerheart Automated External Defibrillator*. 70-02104-00 E.
3. *LIFEPAK CR2 Defibrillator with LIFELINKcentral AED Program Manager Operating Instructions*. 3322738-028.
4. *OnSite Defibrillator OWNER'S MANUAL*. M5066A Edition 16.
5. *ZOLL AED 3 Administrator's Guide*. 9650-000752-12 Rev. N.
6. *ZOLL AED Plus Administrator's Guide*. 9650-301-05. Rev. G.

All claims valid as of 10/2025.

For further information, please contact your Stryker representative or visit our website at stryker.com

Emergency Care Public Access

AED users should be trained in CPR and in the use of the AED. Although not everyone can be saved, studies show that early defibrillation can dramatically improve survival rates. AEDs are indicated for use on adults and children. AEDs may be used on children weighing less than 25 kg (55 lb) but some models require separate defibrillation electrodes.

The information presented is intended to demonstrate Stryker's product offerings. Refer to operating instructions for complete directions for use indications, contraindications, warnings, cautions, and potential adverse events, before using any of Stryker's products. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your representative if you have questions about the availability of Stryker's products in your area. Specifications subject to change without notice.

CE 0123 HeartSine samaritan PAD is a class III – 0123 device in accordance with EU MDR.

HeartSine samaritan PAD: UL Classified. See complete marking on product.

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